

Table 12 (continued):

DATA FOR NOVEMBER 1992 (Cont.)		Mean Catch Per Unit Effort (CPUE)			
Common Name		Number/hr/net		Kilograms/hr/net	
	Silver Jenny	0.98	(3.9)	0.0080	(0.0322)
	Gizzard Shad	0.85	(4.4)	0.0274	(0.1304)
	Southern Stargazer	0.81	(2.6)	0.0023	(0.0082)
	Gafftopsail Catfish	0.79	(2.8)	0.0324	(0.1109)
	Pipefish	0.72	(4.3)	0.0010	(0.0061)
	Lesser Rock Shrimp	0.61	(1.9)	0.0006	(0.0020)
	Blackwing Searobin	0.61	(2.6)	0.0120	(0.0658)
	Southern Flounder	0.59	(2.0)	0.1226	(0.3797)
	Shrimp Eel	0.59	(2.2)	0.0558	(0.2083)
	Planehead Filefish	0.51	(1.9)	0.0035	(0.0135)
	Darter Goby	0.49	(2.3)	0.0001	(0.0003)
	Green Porcelain Crab	0.42	(2.5)	0.0002	(0.0013)
	Mud Crab	0.42	(3.6)	0.0000	(0.0000)
	Scaled Sardine	0.41	(1.8)	0.0008	(0.0038)
	Smoothhead Scorpionfish	0.40	(1.7)	0.0079	(0.0330)
	Rock Sea Bass	0.21	(0.8)	0.0097	(0.0354)
	Unidentified Shrimp Eel	0.21	(1.3)	0.0002	(0.0010)
	Skilletfish	0.17	(1.0)	0.0026	(0.0155)
	Blotched Swimming Crab	0.17	(1.0)	0.0017	(0.0100)
	Tidewater Mojarra	0.16	(0.7)	0.0011	(0.0051)
	Bluefish	0.14	(0.9)	0.0003	(0.0016)
	Unidentified Snapping Shrimp	0.14	(0.9)	0.0003	(0.0017)
	Lane Snapper	0.10	(0.6)	0.0056	(0.0336)
	Moonfish	0.08	(0.5)	0.0005	(0.0029)
	Unidentified Mojarra	0.05	(0.3)	0.0003	(0.0021)
	Creville Jack	0.03	(0.2)	0.0007	(0.0044)
	Sergestid Shrimp	0.00	(0.0)	0.0000	(0.0001)
	Perverse Whelk	0.00	(0.0)	0.0009	(0.0055)
	American Oyster	0.00	(0.0)	0.0355	(0.1866)
	Debris	0.00	(0.0)	0.6185	(1.3175)
	Dimpled Hermit Crab	0.00	(0.0)	0.0030	(0.0181)
	Butterfish	0.00	(0.0)	0.0005	(0.0027)
	Moon Snail	0.00	(0.0)	0.0482	(0.2895)
	Atlantic Rangia	0.00	(0.0)	0.0338	(0.2030)
	Unidentified Anemone	0.00	(0.0)	0.0024	(0.0088)
	Unidentified Fish	0.00	(0.0)	0.0287	(0.1300)
	Unidentified Jellyfish	0.00	(0.0)	0.0329	(0.0518)
	Unidentified Shells	0.00	(0.0)	0.0036	(0.0182)

Table 13. Catch per unit effort (CPUE) statistics for all species captured during shrimp trawling within each area of Galveston Bay between March-November 1992. Species ranked in descending order based on number captured per hour tow. Statistics include total (sum), mean and standard deviation of monthly CPUE (number and biomass) for each species. Areas include Lower/West Bay (L), Trinity Bay (T) and Upper/East Bay (U). Common and scientific names follow American Fisheries Society guidelines (Turgeon et al. 1988, Williams et al. 1988, Robins et al. 1991).

DATA FOR MARCH								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Atlantic Croaker	L	14680.8	3670.2	4372.0	86.5075	21.6269	24.6613
2	Threadfin Shad	L	6479.0	1619.7	3012.1	40.6899	10.1725	18.4402
3	Roughback Shrimp	L	5580.8	1395.2	2712.9	6.6965	1.6741	3.2677
4	Cutlassfish	L	3775.4	943.9	1111.8	58.4965	14.6241	17.6989
5	Gulf Menhaden	L	3547.5	886.9	585.8	47.4611	11.8653	5.8409
6	White Shrimp	L	2159.5	539.9	278.2	5.2945	1.3236	0.5886
7	Bay Anchovy	L	1099.6	274.9	300.1	2.3467	0.5867	0.8813
8	Sand Seatrout	L	1055.6	263.9	357.0	17.4965	4.3741	6.1153
9	Blue Crab	L	619.0	154.7	79.8	12.7648	3.1912	2.4436
10	Bighead Searobin	L	563.1	140.8	151.0	2.6173	0.6543	0.6798
11	Brown Shrimp	L	285.3	71.3	41.7	1.1826	0.2957	0.1362
12	Atlantic Spadefish	L	278.4	69.6	72.3	4.3380	1.0845	1.1579
13	Southern Hake	L	243.5	60.9	44.7	10.9496	2.7374	1.6346
14	Mantis Shrimp	L	233.2	58.3	114.2	0.9445	0.2361	0.4640
15	Pink Shrimp	L	202.0	50.5	35.8	0.7988	0.1997	0.1604
16	Hardhead Catfish	L	129.0	32.3	40.7	1.2948	0.3237	0.2529
17	Spot	L	65.1	16.3	12.9	1.4897	0.3724	0.3002
18	Silver Seatrout	L	25.2	6.3	12.6	0.3577	0.0894	0.1788
19	Fringed Flounder	L	22.6	5.7	7.3	0.0918	0.0229	0.0279
20	Silver Perch	L	17.3	4.3	5.3	0.3724	0.0931	0.1394
21	Gulf Butterfish	L	17.2	4.3	3.3	0.1225	0.0306	0.0219
22	Blackwing Searobin	L	15.3	3.8	7.7	0.0337	0.0084	0.0168
23	Ocellated Flounder	L	11.0	2.7	3.5	0.0712	0.0178	0.0222
24	Bay Whiff	L	10.0	2.5	3.1	0.1254	0.0313	0.0498
25	Least Puffer	L	9.9	2.5	3.1	0.1556	0.0389	0.0464
26	Gafftopsail Catfish	L	6.3	1.6	3.2	0.2909	0.0727	0.1455
27	Bluefish	L	3.7	0.9	1.8	0.0893	0.0223	0.0446
28	Gizzard Shad	L	3.7	0.9	1.8	0.0640	0.0160	0.0320
29	Southern Kingfish	L	3.6	0.9	1.8	0.8003	0.2001	0.4001
30	Inshore Lizardfish	L	3.6	0.9	1.8	0.1575	0.0394	0.0788
31	Debris	L	0.0	0.0	0.0	0.1083	0.0271	0.0542

1	Atlantic Croaker	U	2300.6	-	-	9.8469	-	-
2	Gulf Menhaden	U	656.0	-	-	11.7884	-	-
3	White Shrimp	U	640.7	-	-	1.9070	-	-
4	Blue Crab	U	128.2	-	-	3.1250	-	-
5	Sand Seatrout	U	106.8	-	-	1.2134	-	-
6	Bay Anchovy	U	73.2	-	-	0.0906	-	-
7	Hardhead Catfish	U	36.6	-	-	1.7028	-	-
8	Threadfin Shad	U	24.4	-	-	0.1434	-	-
9	Spotted Seatrout	U	21.4	-	-	0.4333	-	-
10	Spot	U	15.3	-	-	0.4153	-	-
11	Pink Shrimp	U	15.3	-	-	0.0247	-	-
12	Bighead Searobin	U	6.1	-	-	0.0125	-	-
13	Southern Hake	U	3.1	-	-	0.1108	-	-
14	Brown Shrimp	U	3.1	-	-	0.0079	-	-
15	Penaeid Shrimp	U	3.1	-	-	0.0046	-	-
16	Daggorblade Grass Shrimp	U	3.1	-	-	0.0009	-	-
17	Debris	U	0.0	-	-	0.0839	-	-
18	Unidentified Fish	U	0.0	-	-	0.0595	-	-

Table 13 (continued):

DATA FOR APRIL								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
Common Name		ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Atlantic Croaker	L	3105.7	621.1	532.3	15.6921	3.1384	2.6478
2	White Shrimp	L	1773.2	354.6	203.4	6.1592	1.2318	0.6427
3	Roughback Shrimp	L	1142.0	228.4	163.9	1.6829	0.3366	0.2257
4	Blue Crab	L	625.6	125.1	126.5	16.0478	3.2096	2.3396
5	Hardhead Catfish	L	410.4	82.1	115.5	4.1638	0.8328	0.9949
6	Cutlassfish	L	376.0	75.2	62.1	7.2383	1.4477	1.2675
7	Bighead Searobin	L	312.9	62.6	43.8	1.9607	0.3921	0.2972
8	Southern Hake	L	289.3	57.9	42.0	13.1158	2.6232	1.7622
9	Mantis Shrimp	L	241.3	48.3	36.1	1.5219	0.3044	0.2385
10	Threadfin Shad	L	226.4	45.3	24.1	1.9717	0.3943	0.1973
11	Sand Seatrout	L	212.9	42.6	25.3	3.9313	0.7863	0.4156
12	Brown Shrimp	L	208.7	41.7	19.9	2.2539	0.4508	0.4196
13	Pink Shrimp	L	170.1	34.0	20.0	0.7286	0.1457	0.0851
14	Spot	L	147.3	29.5	15.1	4.9361	0.9872	0.4929
15	Silver Seatrout	L	34.7	6.9	6.4	0.4115	0.0823	0.0677
16	Gulf Menhaden	L	30.2	6.0	4.6	1.9497	0.3899	0.2702
17	Bay Anchovy	L	24.7	4.9	5.4	0.0707	0.0141	0.0129
18	Gulf Butterfish	L	19.4	3.9	7.3	0.2996	0.0599	0.0936
19	Fringed Flounder	L	16.3	3.3	3.8	0.0875	0.0175	0.0260
20	Pigfish	L	14.1	2.8	6.3	0.9875	0.1975	0.4416
21	Atlantic Spadefish	L	11.0	2.2	1.9	0.1615	0.0323	0.0256
22	Silver Perch	L	7.9	1.6	3.5	0.1348	0.0270	0.0603
23	Atlantic Brief Squid	L	6.8	1.4	1.3	0.0700	0.0140	0.0204
24	Southern Kingfish	L	5.1	1.0	1.5	0.1963	0.0393	0.0742
25	Parasitic Isopod	L	4.8	1.0	2.1	0.0010	0.0002	0.0004
26	Gafftopsail Catfish	L	4.2	0.8	1.2	0.1665	0.0333	0.0470
27	Spotted Seatrout	L	3.3	0.7	1.5	0.0693	0.0139	0.0310
28	Bay Whiff	L	3.3	0.7	1.5	0.0396	0.0079	0.0177
29	Blackwing Searobin	L	3.3	0.7	1.5	0.0060	0.0012	0.0027
30	Blackcheek Tonguefish	L	3.3	0.7	1.5	0.0050	0.0010	0.0022
31	Lesser Rock Shrimp	L	3.3	0.7	1.5	0.0047	0.0009	0.0021
32	Florida Rock Snail	L	3.3	0.7	1.5	0.0053	0.0011	0.0024
33	Striped Mullet	L	2.6	0.5	1.2	0.8278	0.1656	0.3682
34	Star Drum	L	2.6	0.5	1.2	0.0298	0.0060	0.0133
35	Pinfish	L	2.4	0.5	1.1	0.0666	0.0133	0.0298
36	Least Puffer	L	2.4	0.5	1.1	0.0134	0.0027	0.0060
37	Banded Drum	L	1.1	0.2	0.5	0.0062	0.0012	0.0028
38	Strongtooth Mud Crab	L	1.1	0.2	0.5	0.0009	0.0002	0.0004
39	Debris	L	0.0	0.0	0.0	5.1828	1.0366	1.1048
40	Unidentified Fish	L	0.0	0.0	0.0	0.1931	0.0386	0.0863

Table 13 (continued):

DATA FOR APRIL (CONT.)								
Common Name		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
		ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Atlantic Croaker	T	4095.4	409.5	301.7	38.6370	3.8637	1.6615
2	White Shrimp	T	3955.4	395.5	321.1	16.5732	1.6573	1.1092
3	Blue Catfish	T	3533.7	353.4	242.8	148.1020	14.8102	10.8466
4	Gulf Menhaden	T	951.6	95.2	51.5	37.1342	3.7134	4.3705
5	Ohio Shrimp	T	927.5	92.7	75.1	2.1059	0.2106	0.1787
6	Hardhead Catfish	T	476.2	47.6	33.1	24.3146	2.4315	2.2148
7	Blue Crab	T	350.2	35.0	38.1	4.2866	0.4287	0.5136
8	Sand Seatrout	T	181.2	18.1	11.9	3.0712	0.3071	0.1768
9	Spot	T	117.9	11.8	27.3	6.3243	0.6324	1.5223
10	Spotted Seatrout	T	50.5	5.0	4.0	4.3552	0.4355	0.7042
11	Southern Flounder	T	45.7	4.6	9.7	4.6469	0.4647	0.9264
12	Bay Anchovy	T	37.0	3.7	7.5	0.0145	0.0014	0.0027
13	Hogchoker	T	30.5	3.1	3.3	0.3090	0.0309	0.0355
14	Striped Mullet	T	26.7	2.7	5.1	3.5538	0.3554	0.6655
15	Parasitic Isopod	T	18.0	1.8	3.2	0.0058	0.0006	0.0012
16	Threadfin Shad	T	16.4	1.6	2.5	0.5361	0.0536	0.1450
17	Brown Shrimp	T	12.2	1.2	3.1	0.0124	0.0012	0.0030
18	Gizzard Shad	T	10.1	1.0	1.7	0.8019	0.0802	0.1815
19	Atlantic Rangia	T	8.1	0.8	2.5	136.6316	13.6632	42.2799
20	Gafftopsail Catfish	T	3.2	0.3	1.0	0.1644	0.0164	0.0520
21	Sheephead	T	2.8	0.3	0.9	2.5789	0.2579	0.8155
22	Debris	T	0.0	0.0	0.0	10.2634	1.0263	1.1005
23	American Oyster	T	0.0	0.0	0.0	0.9603	0.0960	0.3037
24	Unidentified Shells	T	0.0	0.0	0.0	0.6833	0.0683	0.2161
25	Unidentified Goby	T	0.0	0.0	0.0	0.0052	0.0005	0.0016
26	Unidentified Species	T	0.0	0.0	0.0	0.0023	0.0002	0.0007

Table 13 (continued):

DATA FOR APRIL (CONT.)								
	Common Name	FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
		ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Atlantic Croaker	U	107359.4	7157.3	7322.3	471.1034	31.4069	25.6243
2	Gulf Menhaden	U	101686.2	6779.1	14044.0	757.7355	50.5157	57.1703
3	White Shrimp	U	14823.2	988.2	704.4	90.1185	6.0079	4.7950
4	Bay Anchovy	U	10472.5	698.2	602.4	23.0596	1.5373	1.6219
5	Cutlassfish	U	9578.1	638.5	752.5	186.6051	12.4403	14.2606
6	Sand Seatrout	U	4754.2	316.9	228.3	82.4441	5.4963	4.3817
7	Threadfin Shad	U	3444.0	229.6	388.9	38.4530	2.5635	4.7145
8	Spot	U	2081.2	138.7	220.8	17.4033	1.1602	1.3405
9	Hardhead Catfish	U	1925.4	128.4	162.0	32.3661	2.1577	2.9737
10	Brown Shrimp	U	1634.8	109.0	120.0	1.5333	0.1022	0.1283
11	Blue Crab	U	1506.3	100.4	130.0	19.8791	1.3253	1.3480
12	Ohio Shrimp	U	641.6	42.8	58.2	1.4950	0.0997	0.1390
13	Parasitic Isopod	U	633.5	42.2	64.9	0.1728	0.0115	0.0178
14	Gafftopsail Catfish	U	217.9	14.5	26.6	14.6744	0.9783	1.6941
15	Blue Catfish	U	185.5	12.4	30.8	9.4578	0.6305	1.7163
16	Atlantic Midshipman	U	116.3	7.8	15.4	2.3357	0.1557	0.3782
17	Gulf Butterfish	U	99.4	6.6	20.3	1.0167	0.0678	0.2408
18	Striped Mullet	U	97.3	6.5	13.7	30.3671	2.0245	4.6873
19	Spotted Seatrout	U	85.6	5.7	14.3	4.3768	0.2918	0.6576
20	Harvestfish	U	68.1	4.5	10.1	2.3286	0.1552	0.3432
21	Silver Perch	U	54.5	3.6	9.3	1.8844	0.1256	0.2902
22	Atlantic Spadefish	U	50.2	3.3	7.6	2.0953	0.1397	0.3390
23	Southern Flounder	U	42.3	2.8	6.0	10.5074	0.7005	2.0718
24	Brackish Grass Shrimp	U	40.3	2.7	10.4	0.0081	0.0005	0.0021
25	Bighead Searobin	U	39.1	2.6	6.0	0.1416	0.0094	0.0247
26	Star Drum	U	38.4	2.6	5.4	0.4088	0.0273	0.0571
27	Least Puffer	U	38.2	2.5	6.9	0.4010	0.0267	0.1010
28	Hogchoker	U	24.9	1.7	5.3	0.2009	0.0134	0.0493
29	Clown Goby	U	24.7	1.6	6.4	0.0074	0.0005	0.0019
30	Southern Kingfish	U	20.9	1.4	4.1	1.1540	0.0769	0.2217
31	Unidentified Grass Shrimp	U	20.9	1.4	5.4	0.0042	0.0003	0.0011
32	Bay Whiff	U	20.3	1.4	3.9	0.0292	0.0019	0.0052
33	Pinfish	U	16.7	1.1	3.1	0.8441	0.0563	0.1590
34	Daggerblade Grass Shrimp	U	11.2	0.7	2.9	0.0022	0.0001	0.0006
35	Black Drum	U	7.9	0.5	2.0	1.1714	0.0781	0.3025
36	Atlantic Mud Crab	U	7.9	0.5	2.0	0.0016	0.0001	0.0004
37	Sheephead	U	7.3	0.5	1.9	6.8077	0.4538	1.7577
38	Highfin Goby	U	6.1	0.4	1.6	0.0533	0.0036	0.0138
39	Gulf Toadfish	U	5.4	0.4	1.4	0.8107	0.0540	0.2093
40	Gizzard Shad	U	5.4	0.4	1.4	0.7387	0.0492	0.1907
41	Debris	U	0.0	0.0	0.0	2.8202	0.1880	0.2480
42	American Oyster	U	0.0	0.0	0.0	1.3358	0.0891	0.2353
43	Unidentified Species	U	0.0	0.0	0.0	0.0729	0.0049	0.0188

Table 13 (continued):

DATA FOR MAY								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Brown Shrimp	L	107682.1	13460.3	10080.9	206.0565	25.7571	18.7194
2	Atlantic Croaker	L	16758.4	2094.8	1523.1	102.3975	12.7997	7.8390
3	Blue Crab	L	2062.1	257.8	248.9	60.7472	7.5934	6.6690
4	Cutlassfish	L	1625.1	203.1	156.0	54.0208	6.7526	4.9641
5	Spot	L	1604.9	200.6	199.1	10.7235	1.3404	1.2159
6	Roughback Shrimp	L	1244.8	155.6	193.1	2.3274	0.2909	0.3646
7	Sand Seatrout	L	959.6	119.9	113.3	9.3001	1.1625	1.1145
8	Atlantic Brief Squid	L	891.9	111.5	90.1	7.5467	0.9433	1.0393
9	White Shrimp	L	582.4	72.8	61.6	5.6809	0.7101	0.5887
10	Bay Anchovy	L	516.6	64.6	60.6	0.7324	0.0915	0.0845
11	Sergestid Shrimp	L	422.6	52.8	149.4	0.0117	0.0015	0.0041
12	Pinfish	L	417.2	52.2	70.4	14.6577	1.8322	2.4852
13	Mantis Shrimp	L	289.8	36.2	43.6	2.0108	0.2514	0.2966
14	Banded Drum	L	246.2	30.8	43.0	0.0341	0.0043	0.0061
15	Blackwing Searobin	L	184.0	23.0	23.8	0.4854	0.0607	0.0670
16	Bighead Searobin	L	148.7	18.6	18.0	1.6400	0.2050	0.2485
17	Atlantic Midshipman	L	133.7	16.7	24.1	3.2014	0.4002	0.6765
18	Gulf Menhaden	L	133.4	16.7	16.9	5.9128	0.7391	0.7305
19	Longnose Spider Crab	L	111.1	13.9	27.2	0.0182	0.0023	0.0054
20	Inshore Lizardfish	L	82.2	10.3	14.4	1.5148	0.1893	0.3001
21	Hardhead Catfish	L	78.5	9.8	13.0	1.7522	0.2190	0.3345
22	Least Puffer	L	65.0	8.1	10.6	0.4273	0.0534	0.0897
23	Bay Whiff	L	62.2	7.8	12.8	0.2663	0.0333	0.0808
24	Threadfin Shad	L	49.3	6.2	15.1	0.5400	0.0675	0.1621
25	Parasitic Isopod	L	40.7	5.1	7.6	0.0031	0.0004	0.0005
26	Harvestfish	L	34.0	4.2	10.3	0.0686	0.0086	0.0220
27	Southern Kingfish	L	29.4	3.7	10.4	1.5334	0.1917	0.5421
28	Lesser Blue Crab	L	23.1	2.9	5.5	0.3592	0.0449	0.0833
29	Fringed Flounder	L	20.2	2.5	3.7	0.1537	0.0192	0.0304
30	Hogchoker	L	18.0	2.2	6.4	0.2958	0.0370	0.1046
31	Pigfish	L	12.4	1.6	4.4	1.0604	0.1326	0.3749
32	Striped Mullet	L	9.4	1.2	3.3	1.8234	0.2279	0.6447
33	Bluefish	L	9.4	1.2	3.3	0.9688	0.1211	0.3425
34	Shrimp Eel	L	9.4	1.2	3.3	0.8017	0.1002	0.2834
35	Gulf Toadfish	L	9.4	1.2	3.3	0.5279	0.0660	0.1866
36	Pink Shrimp	L	9.4	1.2	3.3	0.0604	0.0076	0.0214
37	Atlantic Spadefish	L	9.4	1.2	3.3	0.0538	0.0067	0.0190
38	Southern Hake	L	9.3	1.2	2.1	0.3850	0.0481	0.0892
39	Marsh Grass Shrimp	L	9.1	1.1	3.2	0.0018	0.0002	0.0006
40	Gizzard Shad	L	8.7	1.1	3.1	0.7869	0.0984	0.2782
41	Silver Perch	L	6.0	0.8	2.1	0.1873	0.0234	0.0662
42	Atlantic Threadfin	L	4.7	0.6	1.7	0.0491	0.0061	0.0174
43	Blackcheek Tonguefish	L	4.7	0.6	1.7	0.0165	0.0021	0.0058
44	Gulf Butterfish	L	4.7	0.6	1.7	0.0033	0.0004	0.0012
45	Debris	L	0.0	0.0	0.0	13.1316	1.6414	4.2446
46	Sargassum Seaweed	L	0.0	0.0	0.0	1.2398	0.1550	0.2683
47	Unidentified Jellyfish	L	0.0	0.0	0.0	1.0755	0.1344	0.1338
48	American Oyster	L	0.0	0.0	0.0	0.0546	0.0068	0.0193
49	Unidentified Cockle	L	0.0	0.0	0.0	0.0198	0.0025	0.0070
50	Unidentified Fish	L	0.0	0.0	0.0	0.0105	0.0013	0.0037

Table 13 (continued):

DATA FOR MAY (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Brown Shrimp	T	26166.5	2180.5	4115.9	28.6997	2.3916	4.5340
2	Gulf Menhaden	T	19268.2	1605.7	1373.6	114.0633	9.5053	9.0725
3	Blue Catfish	T	4278.3	356.5	422.6	140.2452	11.6871	12.1664
4	Atlantic Croaker	T	2633.0	219.4	189.7	67.7643	5.6470	4.9227
5	White Shrimp	T	2294.4	191.2	104.7	24.1753	2.0146	1.0163
6	Sand Seatrout	T	1352.8	112.7	109.5	9.9381	0.8282	0.7694
7	Gizzard Shad	T	1033.9	86.2	64.6	20.6431	1.7203	1.2948
8	Hardhead Catfish	T	664.1	55.3	71.9	20.8112	1.7343	1.1408
9	Cutlassfish	T	527.9	44.0	84.1	19.0034	1.5836	3.0189
10	Blue Crab	T	485.0	40.4	68.0	14.0067	1.1672	1.3829
11	Ohio Shrimp	T	252.2	21.0	26.4	0.4585	0.0382	0.0470
12	Bay Anchovy	T	195.4	16.3	25.4	0.0835	0.0070	0.0111
13	Threadfin Shad	T	119.9	10.0	19.6	1.4393	0.1199	0.2779
14	Spot	T	110.8	9.2	9.4	2.1010	0.1751	0.2468
15	Parasitic Isopod	T	57.9	4.8	7.0	0.0137	0.0011	0.0019
16	Spotted Seatrout	T	28.1	2.3	3.9	2.5342	0.2112	0.3671
17	Bay Whiff	T	11.7	1.0	1.9	0.0081	0.0007	0.0012
18	Gafftopsail Catfish	T	4.6	0.4	1.3	0.3472	0.0289	0.1002
19	Hogchoker	T	4.6	0.4	1.3	0.2799	0.0233	0.0808
20	Harvestfish	T	4.6	0.4	1.3	0.0141	0.0012	0.0041
21	Southern Flounder	T	4.2	0.4	0.8	0.6000	0.0500	0.1564
22	Black Drum	T	2.3	0.2	0.7	0.4799	0.0400	0.1385
23	Atlantic Rangia	T	0.0	0.0	0.0	136.6962	11.3914	38.5799
24	Debris	T	0.0	0.0	0.0	24.0255	2.0021	3.5535
25	American Oyster	T	0.0	0.0	0.0	0.9251	0.0771	0.1998
26	Unidentified Fish	T	0.0	0.0	0.0	0.0101	0.0008	0.0029
27	Unidentified Mollusk	T	0.0	0.0	0.0	0.0041	0.0003	0.0012
28	Unidentified species	T	0.0	0.0	0.0	0.0018	0.0002	0.0005

Table 13 (continued):

DATA FOR MAY (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Brown Shrimp	U	147435.6	9214.7	10990.4	307.8127	19.2383	22.8333
2	Cutlassfish	U	41418.6	2588.7	3294.4	1727.1216	107.9451	147.8006
3	Atlantic Croaker	U	34168.9	2135.6	3127.6	466.8624	29.1789	55.7109
4	White Shrimp	U	6509.0	406.8	415.8	73.0120	4.5632	5.4390
5	Atlantic Brief Squid	U	5981.6	373.8	737.6	81.9832	5.1240	10.1042
6	Gulf Menhaden	U	5429.2	339.3	617.1	147.5875	9.2242	18.9046
7	Sand Seatrout	U	2323.2	145.2	174.4	23.7969	1.4873	1.8722
8	Hardhead Catfish	U	1979.7	123.7	305.3	87.0922	5.4433	13.7034
9	Bay Anchovy	U	1675.9	104.7	114.0	1.4152	0.0884	0.0891
10	Blue Crab	U	1131.5	70.7	65.4	28.5097	1.7819	1.4735
11	Atlantic Spadefish	U	716.3	44.8	114.0	14.5906	0.9119	2.3220
12	Banded Drum	U	641.8	40.1	92.0	16.3638	1.0227	2.3863
13	Threadfin Shad	U	604.6	37.8	85.0	8.2044	0.5128	1.1388
14	Sergestid Shrimp	U	283.9	17.7	44.9	0.0188	0.0012	0.0033
15	Spot	U	237.0	14.8	21.9	6.1813	0.3863	0.8082
16	Blackwing Searobin	U	195.6	12.2	38.0	0.7489	0.0468	0.1577
17	Inshore Lizardfish	U	147.6	9.2	36.9	3.5494	0.2218	0.8874
18	Harvestfish	U	127.3	8.0	14.0	0.7206	0.0450	0.0960
19	Parasitic Isopod	U	123.2	7.7	24.7	0.0250	0.0016	0.0050
20	Pigfish	U	103.1	6.4	14.7	7.8346	0.4897	1.1427
21	Bighead Searobin	U	43.7	2.7	8.3	0.1646	0.0103	0.0292
22	Atlantic Midshipman	U	40.8	2.5	10.2	0.9626	0.0602	0.2407
23	Southern Flounder	U	35.5	2.2	4.4	1.1958	0.0747	0.1696
24	Gulf Butterfish	U	26.5	1.7	4.6	0.4778	0.0299	0.1152
25	Gulf Toadfish	U	25.7	1.6	5.8	0.6544	0.0409	0.1209
26	Lesser Blue Crab	U	22.3	1.4	5.6	0.0894	0.0056	0.0223
27	Gizzard Shad	U	19.3	1.2	3.5	0.6522	0.0408	0.1300
28	Gafftopsail Catfish	U	11.8	0.7	3.0	1.3151	0.0822	0.3288
29	Silver Seatrout	U	11.7	0.7	2.9	0.3927	0.0245	0.0982
30	Silver Perch	U	11.7	0.7	2.9	0.3007	0.0188	0.0752
31	Least Puffer	U	11.7	0.7	2.9	0.0035	0.0002	0.0009
32	Striped Mullet	U	10.0	0.6	1.9	0.8604	0.0538	0.1491
33	Spotted Seatrout	U	7.0	0.4	1.0	0.4577	0.0286	0.0684
34	Pinfish	U	4.8	0.3	1.2	0.1154	0.0072	0.0289
35	Bay Whiff	U	2.8	0.2	0.7	0.0075	0.0005	0.0019
36	Hogchoker	U	2.4	0.2	0.6	0.0234	0.0015	0.0059
37	Sheephead	U	1.7	0.1	0.4	0.1142	0.0071	0.0285
38	Bluefish	U	1.7	0.1	0.4	0.0809	0.0051	0.0202
39	Ohio Shrimp	U	1.7	0.1	0.4	0.0032	0.0002	0.0008
40	Unidentified Jellyfish	U	0.0	0.0	0.0	17.7208	1.1076	1.7988
41	American Oyster	U	0.0	0.0	0.0	0.4802	0.0300	0.1150
42	Angelwing	U	0.0	0.0	0.0	0.1249	0.0078	0.0161
43	Sargassum Seaweed	U	0.0	0.0	0.0	0.1058	0.0066	0.0165
44	Unidentified Cockle	U	0.0	0.0	0.0	0.0812	0.0051	0.0203
45	Debris	U	0.0	0.0	0.0	0.0771	0.0048	0.0111
46	Unidentified Fish	U	0.0	0.0	0.0	0.0331	0.0021	0.0058
47	Unidentified Shells	U	0.0	0.0	0.0	0.0149	0.0009	0.0037

Table 13 (continued):

DATA FOR JUNE								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Brown Shrimp	L	134266.2	11188.9	9263.4	242.7993	20.2333	15.4567
2	Spot	L	52917.5	4409.8	4100.0	435.5624	36.2969	29.0328
3	White Shrimp	L	10734.6	894.6	1674.1	13.1971	1.0998	1.6814
4	Sand Seatrout	L	5868.6	489.0	725.8	88.8881	7.4073	10.3799
5	Atlantic Croaker	L	3459.6	288.3	143.3	44.7682	3.7307	3.3690
6	Cutlassfish	L	3206.3	267.2	311.9	190.5910	15.8826	18.9300
7	Gulf Menhaden	L	1795.1	149.6	278.5	46.3879	3.8657	10.4594
8	Atlantic Brief Squid	L	1096.6	91.4	68.7	9.1760	0.7647	0.7243
9	Pinfish	L	610.8	50.9	134.1	11.1675	0.9306	2.2590
10	Bay Anchovy	L	608.5	50.7	76.5	0.3848	0.0321	0.0488
11	Bay Whiff	L	506.6	42.2	74.0	1.1450	0.0954	0.1357
12	Hardhead Catfish	L	410.2	34.2	67.9	19.8534	1.6545	2.9441
13	Gafftopsail Catfish	L	318.0	26.5	40.4	29.1096	2.4258	4.1345
14	Inshore Lizardfish	L	314.8	26.2	46.3	13.3388	1.1116	2.0744
15	Parasitic Isopod	L	291.3	24.3	28.5	0.0535	0.0045	0.0065
16	Atlantic Spadefish	L	269.1	22.4	59.3	19.1009	1.5917	5.0147
17	Blue Crab	L	262.5	21.9	24.8	8.1867	0.6822	0.8717
18	Silver Perch	L	193.9	16.2	29.8	10.1479	0.8457	1.6272
19	Harvestfish	L	136.5	11.4	25.3	1.6200	0.1350	0.2651
20	Lesser Blue Crab	L	111.3	9.3	32.1	0.4873	0.0406	0.1407
21	Highfin Goby	L	82.6	6.9	23.9	2.6344	0.2195	0.7605
22	Fringed Flounder	L	76.9	6.4	12.6	0.6200	0.0517	0.1234
23	Least Puffer	L	72.7	6.1	10.6	0.2780	0.0232	0.0590
24	Atlantic Stingray	L	63.4	5.3	13.0	21.6263	1.8022	5.7876
25	Threadfin Shad	L	62.4	5.2	13.4	0.5702	0.0475	0.1145
26	Striped Mullet	L	52.3	4.4	6.6	8.6547	0.7212	0.9637
27	Atlantic Midshipman	L	50.6	4.2	10.6	1.1167	0.0931	0.2362
28	Southern Flounder	L	38.7	3.2	4.1	4.6157	0.3846	0.5043
29	Hogchoker	L	33.6	2.8	9.7	0.1881	0.0157	0.0543
30	Atlantic Threadfin	L	33.1	2.8	9.5	0.9900	0.0825	0.2858
31	Harris Mud Crab	L	31.9	2.7	7.8	4.7087	0.3924	1.1429
32	Southern Kingfish	L	29.2	2.4	6.6	2.3185	0.1932	0.5471
33	Lookdown	L	22.8	1.9	3.5	0.0842	0.0070	0.0137
34	Pigfish	L	21.5	1.8	6.2	1.6697	0.1391	0.4820
35	Roughback Shrimp	L	16.9	1.4	3.3	0.0017	0.0001	0.0003
36	Marsh Grass Shrimp	L	15.8	1.3	4.6	0.0016	0.0001	0.0005
37	Bighead Searobin	L	9.9	0.8	2.9	0.5858	0.0488	0.1691
38	Spanish Mackerel	L	9.9	0.8	2.9	0.2045	0.0170	0.0590
39	Ocellated Flounder	L	9.0	0.7	2.6	1.0625	0.0885	0.3067
40	Spotfin Mojarra	L	7.9	0.7	2.3	0.1360	0.0113	0.0392
41	Mantis Shrimp	L	7.9	0.7	2.3	0.0158	0.0013	0.0046
42	Gulf Toadfish	L	7.0	0.6	2.0	0.2197	0.0183	0.0634
43	Star Drum	L	5.2	0.4	1.5	0.0098	0.0008	0.0028
44	Blacktip Shark	L	5.0	0.4	1.4	4.2705	0.3559	1.2328
45	Unidentified Jellyfish	L	0.0	0.0	0.0	5.6902	0.4742	0.8559
46	Debris	L	0.0	0.0	0.0	2.0248	0.1687	0.3747
47	Unidentified Fish	L	0.0	0.0	0.0	0.3032	0.0253	0.0745
48	American Oyster	L	0.0	0.0	0.0	0.0885	0.0074	0.0256
49	Unidentified Shell	L	0.0	0.0	0.0	0.0717	0.0060	0.0207
50	Turtle Grass	L	0.0	0.0	0.0	0.0017	0.0001	0.0005

Table 13 (continued):

DATA FOR JUNE (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Brown Shrimp	U	350940.8	14037.6	14359.1	669.3763	26.7751	30.3676
2	Sergestid Shrimp	U	54176.9	2167.1	10661.1	3.5557	0.1422	0.7020
3	Atlantic Croaker	U	33098.2	1323.9	1087.5	282.7616	11.3105	7.4679
4	Gulf Menhaden	U	16856.2	674.2	1017.2	193.7942	7.7518	12.1332
5	Sand Seatrout	U	10685.4	427.4	441.6	92.6811	3.7072	3.8438
6	Cutlassfish	U	8135.6	325.4	547.3	572.5953	22.9038	41.1991
7	Blue Crab	U	5234.3	209.4	209.4	162.9136	6.5165	8.1789
8	Bay Anchovy	U	3052.9	122.1	136.6	1.9293	0.0772	0.0825
9	Spot	U	2870.8	114.8	281.4	38.9280	1.5571	3.6984
10	White Shrimp	U	2297.0	91.9	126.2	34.1038	1.3642	2.1299
11	Hardhead Catfish	U	1557.4	62.3	65.9	75.0401	3.0016	5.8073
12	Harvestfish	U	1419.9	56.8	88.8	23.5453	0.9418	1.9913
13	Atlantic Brief Squid	U	1143.2	45.7	117.9	14.0024	0.5601	1.6385
14	Threadfin Shad	U	742.4	29.7	62.2	11.1741	0.4470	0.9869
15	Roughback Shrimp	U	722.3	28.9	74.4	0.1464	0.0059	0.0159
16	Lesser Blue Crab	U	604.2	24.2	67.7	0.9278	0.0371	0.1022
17	Silver Seatrout	U	542.8	21.7	45.7	20.9137	0.8365	1.7572
18	Bay Whiff	U	520.8	20.8	26.6	1.9108	0.0764	0.1064
19	Least Puffer	U	458.5	18.3	29.1	0.9934	0.0397	0.0723
20	Atlantic Midshipman	U	363.2	14.5	32.8	13.6970	0.5479	1.6579
21	Gulf Butterfish	U	357.2	14.3	35.5	12.2566	0.4903	1.2690
22	Banded Drum	U	338.8	13.6	26.0	8.7648	0.3506	0.7524
23	Star Drum	U	266.0	10.6	53.2	0.6562	0.0262	0.1312
24	Inshore Lizardfish	U	247.9	9.9	23.0	3.1535	0.1261	0.3417
25	Striped Anchovy	U	229.0	9.2	34.3	0.7512	0.0300	0.1110
26	Bighead Searobin	U	220.9	8.8	12.2	3.8603	0.1544	0.3305
27	Atlantic Bumper	U	218.3	8.7	23.8	8.8305	0.3532	1.0226
28	Gizzard Shad	U	140.0	5.6	10.6	5.0886	0.2035	0.3994
29	Spanish Mackerel	U	138.5	5.5	8.5	8.2408	0.3296	0.8902
30	Parasitic Isopod	U	117.4	4.7	7.0	0.0206	0.0008	0.0014
31	Atlantic Threadfin	U	110.2	4.4	11.1	1.3456	0.0538	0.1475
32	Brackish Grass Shrimp	U	104.3	4.2	11.9	0.0151	0.0006	0.0020
33	Blackwing Searobin	U	79.7	3.2	13.1	0.2904	0.0116	0.0456
34	Hogchoker	U	70.8	2.8	11.2	1.2128	0.0485	0.2261
35	Ohio Shrimp	U	61.7	2.5	9.5	0.0254	0.0010	0.0038
36	Pinfish	U	56.7	2.3	7.6	1.5150	0.0606	0.1975
37	Fringed Flounder	U	56.2	2.2	4.0	0.1900	0.0076	0.0213
38	Southern Kingfish	U	54.7	2.2	5.3	5.1558	0.2062	0.4738
39	Mantis Shrimp	U	54.5	2.2	6.3	0.0523	0.0021	0.0069
40	Atlantic Spadefish	U	51.5	2.1	5.9	0.6398	0.0256	0.0837
41	Blackcheek Tonguefish	U	43.0	1.7	5.3	0.3755	0.0150	0.0457
42	Pigfish	U	41.9	1.7	6.1	4.8532	0.1941	0.7100
43	Iridescent Swimming Crab	U	41.4	1.7	6.1	0.1168	0.0047	0.0201
44	Gulf Toadfish	U	37.6	1.5	6.1	2.6847	0.1074	0.4547
45	Blue Catfish	U	35.0	1.4	5.2	1.2314	0.0493	0.1984
46	Southern Flounder	U	31.7	1.3	3.2	2.2119	0.0885	0.2349
47	Harris Mud Crab	U	31.2	1.2	4.4	4.6849	0.1874	0.6600
48	Scalloped Hammerhead	U	29.6	1.2	5.9	11.5105	0.4604	2.3021
49	Atlantic Stingray	U	21.3	0.9	4.3	4.2434	0.1697	0.8487
50	Unidentified Isopod	U	16.6	0.7	2.8	0.0017	0.0001	0.0003
51	Spotted Seatrout	U	16.5	0.7	2.8	3.6517	0.1461	0.6459
52	Silver Perch	U	15.7	0.6	3.1	0.3266	0.0131	0.0653
53	Unidentified Grass Shrimp	U	15.7	0.6	3.1	0.0016	0.0001	0.0003
54	Striped Burrfish	U	14.0	0.6	2.8	0.1851	0.0074	0.0370
55	Calico Box Crab	U	14.0	0.6	2.8	0.1683	0.0067	0.0337
56	Dwarf Herring	U	13.8	0.6	2.8	0.0041	0.0002	0.0008
57	Rock Sea Bass	U	13.7	0.5	2.7	0.1877	0.0075	0.0375
58	Black Drum	U	9.3	0.4	1.0	1.8309	0.0732	0.2056

Table 13 (continued):

DATA FOR JUNE (CONT.)								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
59	Daggerblade Grass Shrimp	U	8.0	0.3	1.6	0.0016	0.0001	0.0003
60	Atlantic Mud Crab	U	8.0	0.3	1.6	0.0016	0.0001	0.0003
61	Gafftopsail Catfish	U	8.0	0.3	1.6	0.0468	0.0019	0.0094
62	Striped Blenny	U	5.7	0.2	1.1	0.0449	0.0018	0.0090
63	Lookdown	U	3.3	0.1	0.7	0.0043	0.0002	0.0009
64	Pipefish	U	3.3	0.1	0.7	0.0010	0.0000	0.0002
65	Cownose Ray	U	2.8	0.1	0.6	0.9671	0.0387	0.1934
66	American Oyster	U	0.0	0.0	0.0	26.5095	1.0604	2.7023
67	Debris	U	0.0	0.0	0.0	3.4318	0.1373	0.2825
68	Sponge	U	0.0	0.0	0.0	0.7248	0.0290	0.1153
69	Angelwing	U	0.0	0.0	0.0	0.6212	0.0249	0.0596
70	Unidentified Shell	U	0.0	0.0	0.0	0.4003	0.0160	0.0568
71	Blood Ark	U	0.0	0.0	0.0	0.3985	0.0159	0.0503
72	Sargassum Seaweed	U	0.0	0.0	0.0	0.1510	0.0060	0.0299
73	Unidentified Jellyfish	U	0.0	0.0	0.0	0.1404	0.0056	0.0163
74	Unidentified Shell	U	0.0	0.0	0.0	0.0690	0.0028	0.0093
75	Gulf Oyster Drill	U	0.0	0.0	0.0	0.0535	0.0021	0.0107
76	Perverse Whelk	U	0.0	0.0	0.0	0.0263	0.0011	0.0053
77	Unidentified Barnacle	U	0.0	0.0	0.0	0.0257	0.0010	0.0051
78	Unidentified Fish	U	0.0	0.0	0.0	0.0176	0.0007	0.0020
79	Common Barnacle	U	0.0	0.0	0.0	0.0023	0.0001	0.0005

Table 13 (continued):

DATA FOR JULY								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Brown Shrimp	L	67845.8	4523.1	4949.8	151.3315	10.0888	8.9691
2	White Shrimp	L	31810.3	2120.7	2827.6	87.5805	5.8387	8.7790
3	Atlantic Croaker	L	10921.8	728.1	1141.8	105.8262	7.0551	7.0001
4	Gulf Menhaden	L	3462.7	230.8	661.1	31.7066	2.1138	5.5828
5	Sand Seatrout	L	2835.9	189.1	146.0	27.0471	1.8031	1.5033
6	Spot	L	2635.2	175.7	273.4	30.1572	2.0105	3.6116
7	Bay Anchovy	L	2603.8	173.6	470.3	1.3839	0.0923	0.2355
8	Roughback Shrimp	L	1647.8	109.9	131.0	1.0922	0.0728	0.1035
9	Gafftopsail Catfish	L	1565.4	104.4	135.7	16.3904	1.0927	1.5898
10	Cutlassfish	L	1263.5	84.2	159.2	19.9534	1.3302	1.4087
11	Atlantic Brief Squid	L	949.8	63.3	66.7	9.6716	0.6448	0.5951
12	Blue Crab	L	783.8	52.3	71.9	34.5389	2.3026	3.9700
13	Mantis Shrimp	L	780.9	52.1	73.8	5.4019	0.3601	0.9337
14	Lesser Blue Crab	L	475.0	31.7	51.1	2.4840	0.1656	0.2936
15	Hardhead Catfish	L	289.9	19.3	32.8	6.4610	0.4307	0.7016
16	Least Puffer	L	238.9	15.9	22.4	0.6808	0.0454	0.0572
17	Sergestid Shrimp	L	192.0	12.8	24.8	0.0074	0.0005	0.0011
18	Bay Whiff	L	186.9	12.5	15.5	1.0267	0.0684	0.0845
19	Atlantic Midshipman	L	154.9	10.3	15.0	1.9448	0.1297	0.1908
20	Fringed Flounder	L	117.2	7.8	17.1	0.5255	0.0350	0.0947
21	Harvestfish	L	86.9	5.8	8.2	0.8974	0.0598	0.1488
22	Seabob	L	86.1	5.7	14.8	0.1185	0.0079	0.0185
23	Parasitic Isopod	L	85.0	5.7	11.4	0.0114	0.0008	0.0013
24	Pinfish	L	82.2	5.5	9.9	3.1706	0.2114	0.4410
25	Atlantic Spadefish	L	74.7	5.0	8.2	3.4617	0.2308	0.5329
26	Striped Anchovy	L	70.3	4.7	16.3	0.2505	0.0167	0.0552
27	Threadfin Shad	L	59.9	4.0	6.4	0.6865	0.0458	0.0827
28	Star Drum	L	58.2	3.9	5.1	0.8043	0.0536	0.1575
29	Banded Drum	L	50.6	3.4	6.3	0.0144	0.0010	0.0017
30	Inshore Lizardfish	L	47.9	3.2	5.6	1.2013	0.0801	0.1399
31	Southern Flounder	L	43.8	2.9	5.6	7.8609	0.5241	1.0143
32	Southern Kingfish	L	34.8	2.3	6.4	3.4417	0.2294	0.6238
33	Atlantic Stingray	L	24.5	1.6	3.9	2.5527	0.1702	0.3681
34	Bighead Searobin	L	24.5	1.6	2.7	0.2109	0.0141	0.0269
35	Silver Perch	L	20.0	1.3	3.4	0.8219	0.0548	0.1995
36	Debris	L	18.0	1.2	4.7	5.1051	0.3403	0.5326
37	Atlantic Threadfin	L	17.8	1.2	3.3	0.8048	0.0537	0.1730
38	Gulf Butterfish	L	13.6	0.9	2.9	0.2489	0.0166	0.0600
39	Lookdown	L	13.6	0.9	2.9	0.0327	0.0022	0.0061
40	Spanish Mackerel	L	9.3	0.6	2.4	0.0734	0.0049	0.0189
41	Gulf Toadfish	L	9.2	0.6	2.4	0.2488	0.0166	0.0642
42	Blackwing Searobin	L	7.7	0.5	1.1	0.0476	0.0032	0.0067
43	Crevalle Jack	L	7.0	0.5	1.8	0.1402	0.0093	0.0362
44	Ohio Shrimp	L	7.0	0.5	1.8	0.0014	0.0001	0.0004
45	Striped Blenny	L	5.0	0.3	1.3	0.0300	0.0020	0.0077
46	Striped Mullet	L	4.7	0.3	1.2	1.2726	0.0848	0.3286
47	Sheephead	L	3.6	0.2	0.9	0.3929	0.0262	0.1015
48	Atlantic Mud Crab	L	3.6	0.2	0.9	0.0281	0.0019	0.0073
49	Blackcheek Tonguefish	L	3.6	0.2	0.9	0.0069	0.0005	0.0018
50	Guaguanche	L	3.6	0.2	0.9	0.0029	0.0002	0.0007
51	Florida Stone Crab	L	2.4	0.2	0.6	0.0043	0.0003	0.0011
52	Flatback Mud Crab	L	2.4	0.2	0.6	0.0005	0.0000	0.0001
53	Pigfish	L	2.2	0.1	0.6	0.1742	0.0116	0.0450
54	Unidentified Jellyfish	L	0.0	0.0	0.0	0.6771	0.0451	0.1499
55	American Oyster	L	0.0	0.0	0.0	0.0083	0.0006	0.0021
56	Red Drum	L	0.0	0.0	0.0	0.0059	0.0004	0.0015
57	Sargassum Seaweed	L	0.0	0.0	0.0	0.0050	0.0003	0.0013

Table 13 (continued):

DATA FOR JULY (CONT.)								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Atlantic Croaker	U	10286.1	381.0	256.7	112.3187	4.1600	2.6133
2	Brown Shrimp	U	10001.0	370.4	262.4	33.2854	1.2328	0.9200
3	Sand Seatrout	U	8813.8	326.4	260.2	103.6972	3.8406	3.4742
4	Gulf Menhaden	U	8751.3	324.1	227.9	91.2328	3.3790	3.3133
5	White Shrimp	U	8178.8	302.9	212.8	34.9985	1.2962	1.2323
6	Blue Crab	U	5953.1	220.5	246.1	307.9301	11.4048	12.3861
7	Cutlassfish	U	5923.5	219.4	187.9	159.3874	5.9032	6.8442
8	Spot	U	5800.9	214.9	199.4	76.8639	2.8468	2.4820
9	Bay Anchovy	U	5705.9	211.3	196.8	3.7746	0.1398	0.1601
10	Atlantic Brief Squid	U	4080.0	151.1	226.5	17.3086	0.6411	0.8763
11	Hardhead Catfish	U	3448.4	127.7	109.6	70.3268	2.6047	2.2531
12	Gafftopsail Catfish	U	2627.8	97.3	114.6	25.4229	0.9416	1.1377
13	Bay Whiff	U	2561.9	94.9	170.7	10.3808	0.3845	0.6501
14	Harvestfish	U	1896.4	70.2	71.8	41.5764	1.5399	1.4659
15	Roughback Shrimp	U	1869.8	69.3	196.8	0.5579	0.0207	0.0628
16	Star Drum	U	1771.2	65.6	193.6	4.2291	0.1566	0.4126
17	Least Puffer	U	1303.9	48.3	76.9	3.7883	0.1403	0.2733
18	Threadfin Shad	U	1130.8	41.9	61.3	13.4961	0.4999	0.7505
19	Atlantic Midshipman	U	1101.6	40.8	99.1	30.2429	1.1201	3.1499
20	Fringed Flounder	U	997.0	36.9	53.1	3.2902	0.1219	0.1649
21	Unidentified Grass Shrimp	U	716.8	26.5	78.5	0.0990	0.0037	0.0103
22	Parasitic Isopod	U	685.7	25.4	66.1	0.1527	0.0057	0.0197
23	Gizzard Shad	U	649.1	24.0	60.1	10.1586	0.3762	0.8657
24	Bighead Searobin	U	463.3	17.2	27.3	4.8579	0.1799	0.3668
25	Striped Anchovy	U	405.6	15.0	42.1	1.8962	0.0702	0.2049
26	Inshore Lizardfish	U	315.8	11.7	13.6	6.3465	0.2351	0.3068
27	Blackwing Searobin	U	271.3	10.0	25.3	1.0187	0.0377	0.1077
28	Hogchoker	U	268.4	9.9	24.4	4.5065	0.1669	0.4062
29	Striped Mullet	U	226.6	8.4	21.9	10.7853	0.3995	0.9814
30	Silver Perch	U	215.1	8.0	41.4	0.6074	0.0225	0.1169
31	Atlantic Spadefish	U	209.1	7.7	12.9	2.7588	0.1022	0.2035
32	Daggerblade Grass Shrimp	U	203.0	7.5	39.1	0.0162	0.0006	0.0031
33	Spanish Mackerel	U	187.4	6.9	14.2	5.8834	0.2179	0.4240
34	Seabob	U	165.1	6.1	13.1	0.4798	0.0178	0.0394
35	Gulf Toadfish	U	118.2	4.4	13.0	9.6703	0.3582	1.0626
36	Southern Kingfish	U	101.3	3.8	14.9	0.7991	0.0296	0.1195
37	Lesser Blue Crab	U	95.7	3.5	13.2	0.1095	0.0041	0.0157
38	Longnose Spider Crab	U	91.5	3.4	17.6	0.0732	0.0027	0.0141
39	Creville Jack	U	86.5	3.2	11.9	1.3624	0.0505	0.2124
40	Atlantic Bumper	U	76.1	2.8	6.9	0.4950	0.0183	0.0494
41	Pinfish	U	62.0	2.3	7.0	2.0375	0.0755	0.2319
42	Ladyfish	U	61.5	2.3	5.4	3.5185	0.1303	0.3060
43	Lookdown	U	50.1	1.9	4.7	0.3291	0.0122	0.0503
44	Moonfish	U	40.3	1.5	4.9	0.0751	0.0028	0.0085
45	Atlantic Threadfin	U	38.7	1.4	5.6	1.5247	0.0565	0.2093
46	Highfin Goby	U	27.5	1.0	5.3	0.2693	0.0100	0.0518
47	Mantis Shrimp	U	22.8	0.8	4.4	0.0639	0.0024	0.0123
48	Sheephead	U	17.3	0.6	2.3	3.3113	0.1226	0.4614
49	Unidentified Seatrout	U	13.2	0.5	2.5	0.0013	0.0000	0.0003
50	Shrimp Eel	U	12.7	0.5	2.4	2.5016	0.0927	0.4814
51	Guaguancho	U	12.3	0.5	2.4	0.0245	0.0009	0.0047
52	Atlantic Mud Crab	U	11.3	0.4	2.2	0.0304	0.0011	0.0054
53	Southern Flounder	U	9.6	0.4	1.8	0.8209	0.0304	0.1580
54	Mud Crab	U	9.2	0.3	1.8	0.0009	0.0000	0.0002
55	Blackchook Tonguefish	U	5.2	0.2	1.0	0.1068	0.0040	0.0143
56	Atlantic Stingray	U	2.6	0.1	0.5	0.9745	0.0361	0.1876
57	American Oyster	U	0.0	0.0	0.0	44.7062	1.6558	3.4221
58	Debris	U	0.0	0.0	0.0	29.5552	1.0946	3.9717

Table 13 (continued):

DATA FOR JULY (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
59	Unidentified Shell	U	0.0	0.0	0.0	5.5506	0.2056	0.7198
60	Thinstripe Hermit Crab	U	0.0	0.0	0.0	1.9865	0.0736	0.3823
61	Unidentified Jellyfish	U	0.0	0.0	0.0	0.8448	0.0313	0.0478
62	Unidentified Fish	U	0.0	0.0	0.0	0.5257	0.0195	0.0602
63	Sargassum Seaweed	U	0.0	0.0	0.0	0.3440	0.0127	0.0424
64	Moon Snail	U	0.0	0.0	0.0	0.2493	0.0092	0.0364
65	Bent Mussel	U	0.0	0.0	0.0	0.0293	0.0011	0.0056
66	Purplish Tagelus	U	0.0	0.0	0.0	0.0274	0.0010	0.0053
67	Unidentified Sponge	U	0.0	0.0	0.0	0.0274	0.0010	0.0053
68	Sergestid Shrimp	U	0.0	0.0	0.0	0.0153	0.0006	0.0029
69	Unidentified Crab	U	0.0	0.0	0.0	0.0153	0.0006	0.0029
70	Hooked Mussel	U	0.0	0.0	0.0	0.0094	0.0003	0.0018

Table 13 (continued):

DATA FOR AUGUST								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	L	114262.1	22852.4	11770.1	322.0878	64.4176	28.4182
2	Brown Shrimp	L	10884.7	2176.9	742.7	14.1684	2.8337	1.2651
3	Hardhead Catfish	L	7227.3	1445.5	927.2	18.4892	3.6978	2.0881
4	Spot	L	6069.9	1214.0	1004.8	82.4170	16.4834	13.7457
5	Bay Whiff	L	4297.0	859.4	221.1	18.9404	3.7881	0.6591
6	Sand Seatrout	L	4153.3	830.7	406.2	47.9568	9.5914	2.7995
7	Atlantic Croaker	L	3529.4	705.9	339.6	39.2256	7.8451	3.4753
8	Gulf Menhaden	L	1808.0	361.6	210.2	26.8852	5.3770	3.5219
9	Atlantic Brief Squid	L	1533.6	306.7	160.8	11.2082	2.2416	0.8103
10	Gafftopsail Catfish	L	1422.7	284.5	91.9	40.9497	8.1899	2.2439
11	Cutlassfish	L	439.8	88.0	77.6	10.2263	2.0453	2.3663
12	Blue Crab	L	322.2	64.4	76.2	5.8721	1.1744	1.1713
13	Bay Anchovy	L	303.9	60.8	52.4	0.3110	0.0622	0.0218
14	Hogchoker	L	234.7	46.9	37.4	1.5008	0.3002	0.2679
15	Roughback Shrimp	L	155.1	31.0	24.9	0.1066	0.0213	0.0183
16	Star Drum	L	141.8	28.4	21.8	0.7199	0.1440	0.1246
17	Fringed Flounder	L	117.6	23.5	36.6	0.7400	0.1480	0.3060
18	Lesser Blue Crab	L	109.8	22.0	15.3	0.2309	0.0462	0.0327
19	Least Puffer	L	95.3	19.1	21.7	0.3064	0.0613	0.0872
20	Mantis Shrimp	L	75.3	15.1	15.8	0.1410	0.0282	0.0337
21	Harvestfish	L	62.1	12.4	17.2	2.2162	0.4432	0.8213
22	Atlantic Spadefish	L	52.5	10.5	15.7	0.1453	0.0291	0.0432
23	Pinfish	L	39.7	7.9	12.0	0.7883	0.1577	0.2872
24	Striped Mullet	L	35.0	7.0	9.6	9.0970	1.8194	2.6276
25	Southern Flounder	L	35.0	7.0	15.7	5.5142	1.1028	2.4660
26	Shrimp Eel	L	35.0	7.0	15.7	2.1021	0.4204	0.9401
27	Silver Perch	L	35.0	7.0	15.7	0.2363	0.0473	0.1057
28	Parasitic Isopod	L	35.0	7.0	15.7	0.0035	0.0007	0.0016
29	Daggerblade Grass Shrimp	L	35.0	7.0	15.7	0.0018	0.0004	0.0008
30	Creville Jack	L	32.6	6.5	9.3	1.1876	0.2375	0.3509
31	Atlantic Midshipman	L	32.6	6.5	9.3	1.0644	0.2129	0.3077
32	Unidentified Grass Shrimp	L	20.0	4.0	8.9	0.0020	0.0004	0.0009
33	Inshore Lizardfish	L	17.5	3.5	7.8	0.4902	0.0980	0.2192
34	Bighead Searobin	L	17.5	3.5	7.8	0.2065	0.0413	0.0924
35	Atlantic Stingray	L	12.6	2.5	5.6	6.8731	1.3746	3.0737
36	Bluntnose Jack	L	12.6	2.5	5.6	0.0568	0.0114	0.0254
37	Seabob	L	12.6	2.5	5.6	0.0177	0.0035	0.0079
38	Debris	L	0.0	0.0	0.0	5.8230	1.1646	1.8007
39	Unidentified Jellyfish	L	0.0	0.0	0.0	0.7822	0.1564	0.2072
40	Angelwing	L	0.0	0.0	0.0	0.0219	0.0044	0.0098

Table 13 (continued):

DATA FOR AUGUST (CONT.)							
Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
		SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1 White Shrimp	T	5390.8	2695.4	2198.8	22.2547	11.1274	8.8956
2 Gulf Menhaden	T	662.3	331.2	172.9	3.4027	1.7014	0.9302
3 Sand Seatrout	T	344.3	172.2	119.2	10.9570	5.4785	4.0727
4 Atlantic Croaker	T	110.0	55.0	32.4	5.2367	2.6183	2.1070
5 Spot	T	77.3	38.7	10.1	1.5023	0.7512	0.2007
6 Gizzard Shad	T	49.4	24.7	2.6	4.7714	2.3857	1.9632
7 Threadfin Shad	T	23.7	11.8	2.7	2.8424	1.4212	0.3218
8 Harvestfish	T	22.0	11.0	3.9	1.8255	0.9128	0.2053
9 Spanish Mackerel	T	17.5	8.7	0.6	3.2071	1.6036	0.0721
10 Bay Whiff	T	17.1	8.5	7.4	1.2059	0.6029	0.5010
11 Hardhead Catfish	T	15.4	7.7	8.5	2.5216	1.2608	1.7793
12 Bay Anchovy	T	12.5	6.2	4.1	0.0066	0.0033	0.0018
13 Gafftopsail Catfish	T	11.2	5.6	1.5	1.6076	0.8038	0.2559
14 Fringed Flounder	T	9.6	4.8	0.3	0.3240	0.1620	0.2187
15 White Mullet	T	8.3	4.1	5.9	0.9964	0.4982	0.7045
16 Blue Crab	T	6.2	3.1	2.1	0.3267	0.1634	0.2168
17 Parasitic Isopod	T	3.3	1.7	2.3	0.0005	0.0003	0.0004
18 Bighead Searobin	T	1.7	0.8	1.2	0.0100	0.0050	0.0070
19 Least Puffer	T	1.7	0.8	1.2	0.0023	0.0012	0.0016
20 Unidentified Jellyfish	T	0.0	0.0	0.0	0.2610	0.1305	0.0383
21 Debris	T	0.0	0.0	0.0	0.0784	0.0392	0.0514
22 Unidentified Shell	T	0.0	0.0	0.0	0.0758	0.0379	0.0536
23 Unidentified Fish	T	0.0	0.0	0.0	0.0055	0.0027	0.0039
24 American Oyster	T	0.0	0.0	0.0	0.0037	0.0018	0.0026

Table 13 (continued):

DATA FOR AUGUST (CONT.)								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	Gulf Menhaden	U	70864.2	3374.5	5024.5	540.1745	25.7226	36.4781
2	White Shrimp	U	40685.6	1937.4	1713.7	204.9003	9.7572	9.0344
3	Brown Shrimp	U	11346.8	540.3	1063.3	22.9900	1.0948	1.9858
4	Atlantic Croaker	U	11143.7	530.7	439.0	105.7405	5.0353	3.7939
5	Bay Anchovy	U	5703.4	271.6	462.5	2.2147	0.1055	0.1514
6	Hardhead Catfish	U	4039.1	192.3	353.6	41.1982	1.9618	3.6758
7	Spot	U	1754.4	83.5	92.1	27.8899	1.3281	1.2788
8	Atlantic Brief Squid	U	1699.6	80.9	138.9	7.9978	0.3808	0.6858
9	Sand Seatrout	U	1460.5	69.6	52.4	26.6301	1.2681	0.9137
10	White Mullet	U	1442.8	68.7	182.6	24.1883	1.1518	3.5541
11	Blue Crab	U	960.6	45.7	64.4	39.5505	1.8834	2.6796
12	Gizzard Shad	U	901.2	42.9	119.8	7.6778	0.3656	0.8478
13	Bay Whiff	U	684.7	32.6	44.4	4.1999	0.2000	0.2846
14	Threadfin Shad	U	682.6	32.5	35.6	8.4426	0.4020	0.4553
15	Atlantic Bumper	U	501.6	23.9	97.1	1.6444	0.0783	0.3103
16	Fringed Flounder	U	478.6	22.8	50.1	2.8029	0.1335	0.3408
17	Gafftopsail Catfish	U	379.2	18.1	20.4	9.9025	0.4715	0.5381
18	Roughback Shrimp	U	329.3	15.7	49.9	0.1318	0.0063	0.0189
19	Cutlassfish	U	319.8	15.2	21.5	13.8994	0.6619	0.8013
20	Star Drum	U	233.0	11.1	39.6	0.9770	0.0465	0.1539
21	Spanish Mackerel	U	204.6	9.7	14.0	4.7236	0.2249	0.3927
22	Parasitic Isopod	U	194.2	9.2	8.8	0.0218	0.0010	0.0010
23	Pinfish	U	189.8	9.0	18.0	3.7935	0.1806	0.3803
24	Striped Anchovy	U	183.5	8.7	21.9	1.1519	0.0549	0.1298
25	Harvestfish	U	153.1	7.3	9.4	2.4881	0.1185	0.1739
26	Striped Mullet	U	143.0	6.8	12.8	7.5907	0.3615	0.7073
27	Mantis Shrimp	U	137.8	6.6	20.7	0.4904	0.0234	0.0741
28	Bluntnose Jack	U	117.9	5.6	10.3	0.4732	0.0225	0.0396
29	Atlantic Spadefish	U	116.1	5.5	6.2	2.1679	0.1032	0.1728
30	Least Puffer	U	102.4	4.9	8.0	0.4417	0.0210	0.0337
31	Bighead Searobin	U	77.9	3.7	7.1	0.5008	0.0238	0.0477
32	Inshore Lizardfish	U	66.6	3.2	8.6	2.0579	0.0980	0.2918
33	Anchovy	U	66.0	3.1	13.3	0.0528	0.0025	0.0110
34	Lesser Blue Crab	U	52.7	2.5	9.4	0.1103	0.0053	0.0178
35	Creville Jack	U	51.7	2.5	3.7	1.4226	0.0677	0.1213
36	Atlantic Stingray	U	46.1	2.2	5.5	3.2434	0.1544	0.4049
37	Ladyfish	U	31.7	1.5	3.8	5.6923	0.2711	0.7936
38	Southern Kingfish	U	24.7	1.2	3.9	1.4380	0.0685	0.2942
39	Atlantic Midshipman	U	23.9	1.1	2.8	0.6532	0.0311	0.0791
40	Hogchoker	U	18.9	0.9	2.6	0.3716	0.0177	0.0487
41	Scaled Sardine	U	17.5	0.8	3.8	0.0385	0.0018	0.0084
42	Southern Flounder	U	13.8	0.7	1.7	0.6960	0.0331	0.0966
43	Highfin Goby	U	13.6	0.6	2.1	0.1921	0.0091	0.0299
44	Black Drum	U	13.2	0.6	1.7	2.7406	0.1305	0.3954
45	Horse-Eye Jack	U	9.7	0.5	2.1	0.0989	0.0047	0.0216
46	Longnose Spider Crab	U	8.1	0.4	1.8	0.0008	0.0000	0.0002
47	Lookdown	U	6.2	0.3	1.1	0.0717	0.0034	0.0111
48	Spotted Seatrout	U	5.8	0.3	0.9	1.4914	0.0710	0.2243
49	Blackcheek Tonguefish	U	5.1	0.2	1.1	0.0269	0.0013	0.0059
50	Spotfin Mojarra	U	2.4	0.1	0.5	0.0176	0.0008	0.0038
51	Silver Perch	U	2.4	0.1	0.5	0.0111	0.0005	0.0024
52	Moonfish	U	2.4	0.1	0.5	0.0103	0.0005	0.0023
53	Atlantic Thread Herring	U	1.4	0.1	0.3	0.1640	0.0078	0.0358
54	American Oyster	U	0.0	0.0	0.0	12.8755	0.6131	1.8643
55	Debris	U	0.0	0.0	0.0	9.2423	0.4401	1.1904
56	Unidentified Jellyfish	U	0.0	0.0	0.0	8.1997	0.3905	0.4971

Table 13 (continued):

DATA FOR AUGUST (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
Common Name		ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
57	Atlantic Rangia	U	0.0	0.0	0.0	6.0945	0.2902	1.2548
58	Unidentified Shells	U	0.0	0.0	0.0	0.9266	0.0441	0.1189
59	Thinstripe Hermit Crab	U	0.0	0.0	0.0	0.1347	0.0064	0.0294
60	Stout Tagelus	U	0.0	0.0	0.0	0.1057	0.0050	0.0231
61	Sargassum Seaweed	U	0.0	0.0	0.0	0.0737	0.0035	0.0161
62	Unidentified Fish	U	0.0	0.0	0.0	0.0374	0.0018	0.0061
63	Angelwing	U	0.0	0.0	0.0	0.0097	0.0005	0.0021
64	Sergestid Shrimp	U	0.0	0.0	0.0	0.0008	0.0000	0.0002

Table 13 (continued):

DATA FOR SEPTEMBER								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	L	289687.2	18105.4	24643.1	820.4992	51.2812	62.4908
2	Brown Shrimp	L	18900.2	1181.3	1248.7	33.4431	2.0902	2.4299
3	Bay Whiff	L	12601.1	787.6	865.5	72.6039	4.5377	4.8899
4	Atlantic Croaker	L	10568.1	660.5	772.3	202.3078	12.6442	13.9856
5	Sand Seatrout	L	7224.3	451.5	494.3	127.2854	7.9553	7.5343
6	Atlantic Brief Squid	L	4758.3	297.4	346.5	47.2192	2.9512	2.8973
7	Gafftopsail Catfish	L	3189.6	199.3	248.4	119.0185	7.4387	8.9549
8	Bay Anchovy	L	1950.5	121.9	162.5	2.4234	0.1515	0.2813
9	Spot	L	1945.2	121.6	196.4	31.2170	1.9511	3.1575
10	Hardhead Catfish	L	1665.1	104.1	158.0	28.0624	1.7539	2.9547
11	Sergestid Shrimp	L	1254.2	78.4	313.6	0.0505	0.0032	0.0120
12	Gulf Menhaden	L	1133.6	70.9	116.7	14.5956	0.9122	1.1117
13	Fringed Flounder	L	980.1	61.3	66.3	5.0760	0.3172	0.3646
14	Cutlassfish	L	881.0	55.1	82.8	42.2010	2.6376	4.0124
15	Lesser Blue Crab	L	794.5	49.7	41.4	3.4168	0.2136	0.2104
16	Hogchoker	L	694.1	43.4	63.6	4.2340	0.2646	0.3447
17	Star Drum	L	620.8	38.8	51.2	3.6430	0.2277	0.3087
18	Mantis Shrimp	L	456.7	28.5	29.9	2.0544	0.1284	0.1705
19	Blue Crab	L	382.9	23.9	47.0	13.3478	0.8342	1.2413
20	Roughback Shrimp	L	315.6	19.7	29.5	0.2510	0.0157	0.0249
21	Harvestfish	L	265.7	16.6	31.5	0.8211	0.0513	0.0951
22	Lined Sole	L	196.5	12.3	34.6	0.7451	0.0466	0.1400
23	Seabob	L	144.3	9.0	14.2	0.1735	0.0108	0.0204
24	Lookdown	L	139.4	8.7	31.2	0.6342	0.0396	0.1066
25	Parasitic Isopod	L	124.5	7.8	13.2	0.0544	0.0034	0.0098
26	Atlantic Spadefish	L	120.3	7.5	9.8	1.0021	0.0626	0.1307
27	Inshore Lizardfish	L	110.8	6.9	11.5	4.7403	0.2963	0.6918
28	Atlantic Midshipman	L	105.8	6.6	16.4	1.3368	0.0836	0.1901
29	Silver Perch	L	87.3	5.5	13.7	1.2504	0.0782	0.1558
30	Bluntnose Jack	L	67.1	4.2	8.3	0.1781	0.0111	0.0226
31	Atlantic Stingray	L	65.0	4.1	9.5	63.0252	3.9391	10.5470
32	Pinfish	L	59.9	3.7	6.7	2.8461	0.1779	0.3596
33	Silver Jenny	L	59.5	3.7	13.6	0.3936	0.0246	0.0936
34	Striped Anchovy	L	53.4	3.3	13.3	0.1334	0.0083	0.0334
35	Florida Stone Crab	L	46.3	2.9	10.4	4.4984	0.2811	0.9786
36	Shrimp Eel	L	45.7	2.9	7.9	2.8189	0.1762	0.4825
37	Least Puffer	L	45.5	2.8	7.9	0.2143	0.0134	0.0394
38	Blackcheek Tonguefish	L	45.3	2.8	7.1	0.3157	0.0197	0.0448
39	Crevale Jack	L	37.8	2.4	9.5	1.3072	0.0817	0.3268
40	Threadfin Shad	L	35.7	2.2	6.9	0.6243	0.0390	0.1271
41	Violet Goby	L	28.8	1.8	5.2	0.5005	0.0313	0.0934
42	Mojarra	L	26.7	1.7	6.7	0.1281	0.0080	0.0320
43	Scaled Sardine	L	18.9	1.2	4.7	0.1324	0.0083	0.0331
44	Gulf Toadfish	L	16.9	1.1	4.2	0.3492	0.0218	0.0873
45	Rough Silverside	L	15.3	1.0	3.8	0.0473	0.0030	0.0118
46	Sheephead	L	9.1	0.6	2.3	1.1808	0.0738	0.2952
47	Gray Snapper	L	9.1	0.6	2.3	0.1332	0.0083	0.0333
48	Bighead Searobin	L	9.1	0.6	2.3	0.0118	0.0007	0.0029
49	Moonfish	L	5.8	0.4	0.7	0.0158	0.0010	0.0021
50	Atlantic Bumper	L	5.2	0.3	0.7	0.0043	0.0003	0.0006
51	Guaguancho	L	5.1	0.3	0.7	0.0095	0.0006	0.0014
52	Spanish Mackerel	L	5.0	0.3	0.9	0.0087	0.0005	0.0016
53	Striped Mullet	L	4.5	0.3	1.1	1.3837	0.0865	0.3459
54	Flagfin Mojarra	L	1.7	0.1	0.4	0.0091	0.0006	0.0023
55	Tidewater Mojarra	L	1.7	0.1	0.4	0.0055	0.0003	0.0014
56	Iridescent Swimming Crab	L	1.6	0.1	0.4	0.0045	0.0003	0.0011
57	Debris	L	0.0	0.0	0.0	19.4174	1.2136	2.4184
58	Unidentified Jellyfish	L	0.0	0.0	0.0	2.4359	0.1522	0.1889

Table 13 (continued):

		DATA FOR SEPTEMBER (CONT.)						
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.	
59 Sargassum Seaweed	L	0.0	0.0	0.0	1.1553	0.0722	0.2042	
60 Moon Snail	L	0.0	0.0	0.0	0.4632	0.0290	0.0806	
61 American Oyster	L	0.0	0.0	0.0	0.2727	0.0170	0.0501	
62 Unidentified Fish	L	0.0	0.0	0.0	0.1267	0.0079	0.0155	

Table 13 (continued):

DATA FOR SEPTEMBER (CONT.)								
	Common Name	FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
		ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	U	35862.5	1793.1	1525.1	211.4145	10.5707	9.0767
2	Brown Shrimp	U	18210.4	910.5	1142.9	59.7828	2.9891	5.9253
3	Atlantic Croaker	U	10936.2	546.8	962.0	168.5138	8.4257	14.9894
4	Gulf Menhaden	U	10709.5	535.5	1281.4	109.4596	5.4730	12.3109
5	Hardhead Catfish	U	5786.7	289.3	330.9	29.6443	1.4822	1.4725
6	Sand Seatrout	U	2435.6	121.8	181.6	57.6264	2.8813	5.0514
7	Atlantic Brief Squid	U	2357.4	117.9	113.5	21.3407	1.0670	1.0178
8	Bay Anchovy	U	2014.1	100.7	125.8	1.1089	0.0554	0.0659
9	Blue Crab	U	1130.2	56.5	42.5	43.6149	2.1807	2.2583
10	Bay Whiff	U	536.7	26.8	42.2	3.5558	0.1778	0.2611
11	Harvestfish	U	518.6	25.9	16.0	2.8735	0.1437	0.1572
12	Fringed Flounder	U	515.4	25.8	29.7	3.1785	0.1589	0.1877
13	Spot	U	455.1	22.8	32.2	11.9690	0.5985	0.8399
14	Atlantic Bumper	U	441.5	22.1	45.5	0.7930	0.0396	0.0637
15	Inshore Lizardfish	U	417.4	20.9	36.8	6.1430	0.3072	0.5060
16	Scaled Sardine	U	392.1	19.6	47.9	1.3109	0.0655	0.1267
17	Striped Anchovy	U	369.5	18.5	41.1	2.7336	0.1367	0.2891
18	Roughback Shrimp	U	292.0	14.6	30.5	0.1565	0.0078	0.0150
19	Seabob	U	261.6	13.1	43.7	0.3504	0.0175	0.0507
20	Threadfin Shad	U	259.2	13.0	25.1	2.7567	0.1378	0.2878
21	Star Drum	U	234.7	11.7	23.4	1.6028	0.0801	0.1410
22	Lesser Blue Crab	U	230.5	11.5	18.0	1.1802	0.0590	0.0962
23	Bluntnose Jack	U	229.2	11.5	9.1	2.0254	0.1013	0.0898
24	Least Puffer	U	227.6	11.4	15.8	1.0169	0.0508	0.0706
25	Parasitic Isopod	U	202.0	10.1	14.7	0.0252	0.0013	0.0021
26	Gafftopsail Catfish	U	186.9	9.3	22.2	9.1376	0.4569	0.9243
27	Mantis Shrimp	U	183.5	9.2	12.6	1.1263	0.0563	0.0866
28	Atlantic Spadefish	U	143.3	7.2	8.8	1.7190	0.0860	0.1510
29	Cutlassfish	U	137.0	6.9	13.2	7.5288	0.3764	0.7438
30	Spanish Mackerel	U	105.7	5.3	8.3	1.6357	0.0818	0.1414
31	Flagfin Mojarra	U	59.3	3.0	11.1	0.3799	0.0190	0.0701
32	Atlantic Midshipman	U	52.7	2.6	7.1	0.9735	0.0487	0.1160
33	Hogchoker	U	34.1	1.7	3.4	0.3861	0.0193	0.0417
34	Gizzard Shad	U	31.8	1.6	3.9	0.7920	0.0396	0.1018
35	Southern Kingfish	U	30.5	1.5	3.5	0.3433	0.0172	0.0402
36	Lined Sole	U	27.5	1.4	4.4	0.0794	0.0040	0.0123
37	Spotfin Mojarra	U	27.1	1.4	4.2	0.2168	0.0108	0.0338
38	Bighead Searobin	U	20.2	1.0	2.3	0.2513	0.0126	0.0326
39	Silver Jenny	U	16.5	0.8	2.6	0.1140	0.0057	0.0182
40	Moonfish	U	16.3	0.8	2.1	0.0458	0.0023	0.0062
41	Guaguanche	U	10.5	0.5	1.4	0.0328	0.0016	0.0045
42	Atlantic Stingray	U	9.8	0.5	1.4	2.3071	0.1154	0.3455
43	Silver Perch	U	8.3	0.4	1.1	0.1624	0.0081	0.0207
44	Unidentified Portunid Crab	U	7.8	0.4	1.2	0.0149	0.0007	0.0024
45	Pinfish	U	7.3	0.4	1.4	0.4141	0.0207	0.0763
46	Crovalle Jack	U	6.1	0.3	1.4	0.0360	0.0018	0.0081
47	White Mullet	U	5.0	0.3	0.6	0.1216	0.0061	0.0152
48	Blackwing Searobin	U	4.4	0.2	0.7	0.0547	0.0027	0.0091
49	Lookdown	U	3.9	0.2	0.9	0.1185	0.0059	0.0265
50	Striped Mullet	U	3.6	0.2	0.8	0.2638	0.0132	0.0590
51	Gulf Toadfish	U	3.3	0.2	0.5	0.1942	0.0097	0.0337
52	Ladyfish	U	1.7	0.1	0.4	0.4125	0.0206	0.0922
53	Sheephead	U	1.2	0.1	0.3	0.2579	0.0129	0.0577
54	Xanthid Mud Crab	U	1.2	0.1	0.3	0.0024	0.0001	0.0005
55	Jellyfish	U	0.0	0.0	0.0	15.9027	0.7951	1.1030
56	American Oyster	U	0.0	0.0	0.0	6.6332	0.3317	0.6868
57	Unidentified Shell	U	0.0	0.0	0.0	2.2113	0.1106	0.2441
58	Debris	U	0.0	0.0	0.0	2.0660	0.1033	0.2148

Table 13 (continued):

DATA FOR SEPTEMBER (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
Common Name		ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
59	Atlantic Rangia	U	0.0	0.0	0.0	0.7333	0.0367	0.0935
60	Thinstripe Hermit Crab	U	0.0	0.0	0.0	0.2720	0.0136	0.0608
61	Moon Snail	U	0.0	0.0	0.0	0.1660	0.0083	0.0353
62	Unidentified Xanthid Crab	U	0.0	0.0	0.0	0.0079	0.0004	0.0018
63	Sargassum Seaweed	U	0.0	0.0	0.0	0.0036	0.0002	0.0008

Table 13 (continued):

DATA FOR OCTOBER								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	L	23976.0	1998.0	2021.0	93.2968	7.7747	7.2173
2	Atlantic Brief Squid	L	6096.0	508.0	703.8	86.4493	7.2041	13.9595
3	Cutlassfish	L	3609.8	300.8	626.5	101.3128	8.4427	17.1800
4	Sand Seatrout	L	3176.7	264.7	436.3	97.5529	8.1294	11.6420
5	Atlantic Croaker	L	2683.0	223.6	253.9	83.4850	6.9571	6.6618
6	Gulf Menhaden	L	1287.7	107.3	169.7	25.2252	2.1021	3.1795
7	Spot	L	1136.7	94.7	225.8	28.5796	2.3816	5.4913
8	Star Drum	L	612.3	51.0	133.0	7.7029	0.6419	1.7547
9	Bay Anchovy	L	599.5	50.0	43.7	0.9123	0.0760	0.0889
10	Brown Shrimp	L	460.4	38.4	47.1	1.1858	0.0988	0.1238
11	Harvestfish	L	415.1	34.6	70.9	5.3954	0.4496	0.9874
12	Lookdown	L	247.9	20.7	59.1	2.3509	0.1959	0.5756
13	Bay Whiff	L	144.6	12.1	15.6	1.2765	0.1064	0.1306
14	Mantis Shrimp	L	136.2	11.4	27.5	0.8249	0.0687	0.1512
15	Fringed Flounder	L	117.6	9.8	19.7	0.8021	0.0668	0.1231
16	Roughback Shrimp	L	89.2	7.4	16.3	0.0914	0.0076	0.0169
17	Parasitic Isopod	L	72.6	6.1	7.8	0.0097	0.0008	0.0010
18	Inshore Lizardfish	L	61.0	5.1	5.3	3.9787	0.3316	0.4637
19	Hardhead Catfish	L	58.4	4.9	8.7	2.2614	0.1885	0.4682
20	Gafftopsail Catfish	L	56.3	4.7	13.2	12.4402	1.0367	3.3055
21	Pinfish	L	55.7	4.6	8.5	2.7398	0.2283	0.4465
22	Blue Crab	L	49.8	4.2	13.2	6.2721	0.5227	1.6293
23	Peppermint Shrimp	L	46.1	3.8	13.3	0.0046	0.0004	0.0013
24	Silver Perch	L	44.3	3.7	7.4	0.7819	0.0652	0.1317
25	Bluntnose Jack	L	36.9	3.1	4.2	0.1688	0.0141	0.0215
26	Bighead Searobin	L	35.1	2.9	4.4	1.2829	0.1069	0.3191
27	Atlantic Bumper	L	30.6	2.6	6.6	0.1398	0.0117	0.0343
28	Least Puffer	L	24.7	2.1	3.7	0.0492	0.0041	0.0068
29	Spanish Mackerel	L	24.2	2.0	6.6	0.7670	0.0639	0.2049
30	Lesser Blue Crab	L	20.1	1.7	2.5	0.1337	0.0111	0.0165
31	Striped Anchovy	L	11.7	1.0	1.8	0.1609	0.0134	0.0247
32	Rock Sea Bass	L	6.6	0.6	1.3	0.1781	0.0148	0.0351
33	Atlantic Spadefish	L	6.4	0.5	1.0	0.4018	0.0335	0.0678
34	Black Drum	L	5.1	0.4	1.5	6.9910	0.5826	2.0181
35	Silver Jenny	L	3.5	0.3	1.0	0.0254	0.0021	0.0073
36	Moonfish	L	2.7	0.2	0.5	0.0118	0.0010	0.0024
37	Gulf Butterfish	L	2.6	0.2	0.5	0.0019	0.0002	0.0004
38	Striped Mullet	L	2.6	0.2	0.7	1.2388	0.1032	0.3576
39	Southern Kingfish	L	1.5	0.1	0.4	0.3067	0.0256	0.0885
40	Blotched Swimming Crab	L	1.2	0.1	0.3	0.0166	0.0014	0.0048
41	Scaled Sardine	L	1.2	0.1	0.3	0.0008	0.0001	0.0002
42	Debris	L	0.0	0.0	0.0	5.2872	0.4406	0.6745
43	Unidentified Jellyfish	L	0.0	0.0	0.0	0.6532	0.0544	0.1104
44	Guaguanche	L	0.0	0.0	0.0	0.0014	0.0001	0.0004

Table 13 (continued):

DATA FOR OCTOBER (CONT.)								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	T	8229.9	1028.7	589.6	45.7944	5.7243	3.2032
2	Gulf Menhaden	T	3360.0	420.0	338.8	43.9404	5.4926	4.9527
3	Atlantic Croaker	T	1221.4	152.7	80.0	17.4577	2.1822	1.2018
4	Brown Shrimp	T	1220.5	152.6	84.7	4.4185	0.5523	0.3303
5	Bay Anchovy	T	716.4	89.6	55.7	0.7277	0.0910	0.0570
6	Harvestfish	T	464.3	58.0	45.7	5.4037	0.6755	0.5395
7	Threadfin Shad	T	368.6	46.1	35.7	7.0887	0.8861	0.6866
8	Sand Seatrout	T	358.3	44.8	27.0	12.1011	1.5126	0.9744
9	Atlantic Brief Squid	T	354.8	44.3	29.1	3.8301	0.4788	0.3728
10	Blue Crab	T	210.0	26.3	15.3	7.9310	0.9914	0.9982
11	Parasitic Isopod	T	197.3	24.7	16.4	0.0302	0.0038	0.0025
12	Spot	T	159.2	19.9	12.8	5.3305	0.6663	0.4736
13	Atlantic Spadefish	T	85.9	10.7	21.7	0.7580	0.0948	0.1773
14	Inshore Lizardfish	T	84.6	10.6	11.7	3.4527	0.4316	0.3884
15	Hardhead Catfish	T	84.5	10.6	19.2	3.3188	0.4149	0.4500
16	Fringed Flounder	T	57.2	7.2	4.4	0.3904	0.0488	0.0316
17	Lesser Blue Crab	T	41.5	5.2	7.3	0.2164	0.0270	0.0433
18	Bay Whiff	T	32.8	4.1	3.1	0.2784	0.0348	0.0340
19	Least Puffer	T	26.6	3.3	4.2	0.1165	0.0146	0.0232
20	Southern Kingfish	T	17.0	2.1	5.3	0.7292	0.0912	0.2397
21	Striped Mullet	T	15.1	1.9	1.6	4.1844	0.5230	0.4538
22	Bluntnose Jack	T	15.1	1.9	1.3	0.1099	0.0137	0.0111
23	Bighead Searobin	T	12.3	1.5	2.0	0.3695	0.0462	0.0856
24	Pinfish	T	11.1	1.4	2.3	0.5400	0.0675	0.1114
25	White Mullet	T	8.6	1.1	1.2	0.2361	0.0295	0.0328
26	Lookdown	T	8.2	1.0	1.5	0.0296	0.0037	0.0058
27	Atlantic Bumper	T	5.7	0.7	1.4	0.0151	0.0019	0.0037
28	Hogchoker	T	4.8	0.6	1.2	0.1119	0.0140	0.0362
29	Crevaille Jack	T	3.7	0.5	1.3	0.0767	0.0096	0.0271
30	Gray Snapper	T	3.4	0.4	1.2	0.0686	0.0086	0.0242
31	Mud Crab	T	3.4	0.4	1.2	0.0103	0.0013	0.0036
32	Planehead Filefish	T	3.3	0.4	1.2	0.0062	0.0008	0.0022
33	Gafftopsail Catfish	T	3.0	0.4	1.1	0.1554	0.0194	0.0549
34	Sheephead	T	3.0	0.4	1.1	0.0830	0.0104	0.0293
35	Mantis Shrimp	T	2.8	0.3	1.0	0.0025	0.0003	0.0009
36	Gizzard Shad	T	1.9	0.2	0.7	0.0518	0.0065	0.0183
37	Atlantic Stingray	T	0.4	0.0	0.1	0.0965	0.0121	0.0341
38	Unidentified Jellyfish	T	0.0	0.0	0.0	0.9721	0.1215	0.1426
39	American Oyster	T	0.0	0.0	0.0	0.4698	0.0587	0.1247
40	Debris	T	0.0	0.0	0.0	0.0576	0.0072	0.0130
41	Unidentified Shell	T	0.0	0.0	0.0	0.0039	0.0005	0.0014

Table 13 (continued):

DATA FOR OCTOBER (CONT.)								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	U	58001.7	2900.1	3934.4	262.0143	13.1007	11.6456
2	Brown Shrimp	U	29257.0	1462.8	2199.1	87.5191	4.3760	7.3402
3	Gulf Menhaden	U	17300.9	865.0	1400.2	156.4365	7.8218	10.0900
4	Hardhead Catfish	U	5084.8	254.2	417.6	69.2191	3.4610	8.0884
5	Atlantic Brief Squid	U	4638.4	231.9	265.7	31.0614	1.5531	1.3105
6	Atlantic Croaker	U	4555.5	227.8	191.4	90.6430	4.5322	5.2121
7	Sand Seatrout	U	2692.1	134.6	175.5	63.1110	3.1556	5.6519
8	Blue Crab	U	1131.4	56.6	61.0	32.7782	1.6389	1.5256
9	Threadfin Shad	U	1085.1	54.3	111.6	18.8413	0.9421	2.0879
10	Bay Anchovy	U	1036.2	51.8	40.4	0.9484	0.0474	0.0365
11	Mantis Shrimp	U	981.8	49.1	123.6	8.7323	0.4366	1.1043
12	Bay Whiff	U	873.1	43.7	59.6	7.4173	0.3709	0.5030
13	Harvestfish	U	828.2	41.4	35.1	9.6884	0.4844	0.5373
14	Lesser Blue Crab	U	749.8	37.5	46.4	4.7594	0.2380	0.3069
15	Atlantic Bumper	U	698.7	34.9	67.4	1.6998	0.0850	0.1718
16	Seabob	U	663.0	33.2	127.5	1.4191	0.0710	0.2746
17	Roughback Shrimp	U	624.1	31.2	58.6	0.4457	0.0223	0.0407
18	Atlantic Spadefish	U	467.4	23.4	30.2	3.5094	0.1755	0.4069
19	Fringed Flounder	U	460.0	23.0	35.7	3.9487	0.1974	0.3391
20	Inshore Lizardfish	U	436.6	21.8	31.9	11.6334	0.5817	0.7953
21	Parasitic Isopod	U	368.7	18.4	24.2	0.0518	0.0026	0.0032
22	Least Puffer	U	270.7	13.5	22.1	1.4628	0.0731	0.1394
23	Bluntnose Jack	U	268.4	13.4	13.2	2.3059	0.1153	0.1476
24	Gafftopsail Catfish	U	228.0	11.4	21.4	15.2515	0.7626	1.4349
25	Spot	U	213.8	10.7	9.9	6.7914	0.3396	0.3772
26	Scaled Sardine	U	175.6	8.8	14.8	0.7287	0.0364	0.0683
27	Moonfish	U	174.7	8.7	18.8	0.5200	0.0260	0.0578
28	Southern Kingfish	U	173.1	8.7	13.8	4.3257	0.2163	0.3451
29	Spanish Mackerel	U	173.0	8.6	10.1	3.5819	0.1791	0.2320
30	Iridescent Swimming Crab	U	113.4	5.7	17.5	0.5944	0.0297	0.1062
31	Hogchoker	U	109.0	5.5	10.8	1.5735	0.0787	0.1960
32	Bighead Searobin	U	99.5	5.0	7.9	2.6122	0.1306	0.3506
33	Star Drum	U	99.0	5.0	9.7	0.8699	0.0435	0.0981
34	Cutlassfish	U	82.5	4.1	5.6	1.7524	0.0876	0.1990
35	White Mullet	U	73.4	3.7	14.9	1.6461	0.0823	0.3237
36	Lockdown	U	59.4	3.0	6.7	0.1599	0.0080	0.0178
37	Lined Sole	U	55.7	2.8	6.9	0.1872	0.0094	0.0211
38	Banded Drum	U	51.3	2.6	7.1	0.0855	0.0043	0.0136
39	Guaguanche	U	48.1	2.4	5.5	0.3509	0.0175	0.0423
40	Atlantic Midshipman	U	46.6	2.3	4.8	0.4770	0.0239	0.0751
41	Gulf Toadfish	U	41.9	2.1	5.3	5.0367	0.2518	0.6499
42	Flagfin Mojarra	U	39.1	2.0	3.9	0.3248	0.0162	0.0317
43	Silver Perch	U	32.1	1.6	5.0	0.9055	0.0453	0.1457
44	Pink Shrimp	U	31.9	1.6	6.1	0.1348	0.0067	0.0243
45	Lesser Rock Shrimp	U	30.3	1.5	4.7	0.0123	0.0006	0.0020
46	Rough Silverside	U	29.0	1.5	5.4	0.0563	0.0028	0.0104
47	Gulf Butterfish	U	27.2	1.4	4.2	0.1001	0.0050	0.0156
48	Southern Flounder	U	25.6	1.3	5.7	5.0833	0.2542	1.1367
49	Striped Anchovy	U	23.2	1.2	2.6	0.2149	0.0107	0.0258
50	Black Drum	U	14.1	0.7	3.2	6.3853	0.3193	1.4278
51	Atlantic Sharpnose Shark	U	14.1	0.7	3.2	0.0014	0.0001	0.0003
52	Pinfish	U	12.9	0.6	2.4	0.7939	0.0397	0.1500
53	Silver Jenny	U	10.4	0.5	1.7	0.0673	0.0034	0.0118
54	Blackwing Searobin	U	8.2	0.4	1.4	0.2307	0.0115	0.0370
55	Unidentified Grass Shrimp	U	7.4	0.4	1.7	0.0015	0.0001	0.0003
56	Blackchook Tonguofish	U	6.5	0.3	1.0	0.0265	0.0013	0.0041
57	Leatherjack	U	5.1	0.3	1.1	0.0376	0.0019	0.0084
58	Tidewater Mojarra	U	3.4	0.2	0.8	0.0570	0.0029	0.0128

Table 13 (continued):

DATA FOR OCTOBER (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
59	Spotted Seatrout	U	3.1	0.2	0.7	0.0025	0.0001	0.0005
60	Striped Mullet	U	2.6	0.1	0.6	0.1360	0.0068	0.0304
61	Atlantic Stingray	U	1.7	0.1	0.4	0.2940	0.0147	0.0657
62	Unidentified Jellyfish	U	0.0	0.0	0.0	28.7648	1.4382	2.8370
63	American Oyster	U	0.0	0.0	0.0	18.7158	0.9358	2.8013
64	Debris	U	0.0	0.0	0.0	4.7941	0.2397	0.5010
65	Unidentified Shell	U	0.0	0.0	0.0	2.7950	0.1397	0.4606
66	Thinstripe Hermit Crab	U	0.0	0.0	0.0	0.5909	0.0295	0.0727
67	Pagurid Hermit Crab	U	0.0	0.0	0.0	0.1182	0.0059	0.0209
68	Sargassum Seaweed	U	0.0	0.0	0.0	0.0097	0.0005	0.0022
69	Florida Stone Crab	U	0.0	0.0	0.0	0.0009	0.0000	0.0002
70	Unidentified Fish	U	0.0	0.0	0.0	0.0009	0.0000	0.0002

Table 13 (continued):

DATA FOR NOVEMBER								
	Common Name	FISHING ZONE	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
			SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	L	88469.0	6319.2	8788.2	205.5085	14.6792	19.1201
2	Atlantic Brief Squid	L	6550.9	467.9	564.7	59.0886	4.2206	5.4627
3	Brown Shrimp	L	5360.7	382.9	500.6	15.3171	1.0941	1.2394
4	Atlantic Croaker	L	3102.6	221.6	412.7	114.0695	8.1478	14.1758
5	Silver Perch	L	2553.9	182.4	410.2	41.7464	2.9819	6.4619
6	Spot	L	1930.9	137.9	283.4	44.3405	3.1672	5.9028
7	Bay Anchovy	L	1899.7	135.7	333.1	1.9252	0.1375	0.3291
8	Sand Seatrout	L	1762.9	125.9	201.8	39.7638	2.8403	2.6203
9	Pinfish	L	942.7	67.3	133.1	35.8905	2.5636	5.2919
10	Least Puffer	L	827.4	59.1	65.5	7.0493	0.5035	0.6138
11	Inshore Lizardfish	L	595.9	42.6	41.0	58.7797	4.1985	3.9316
12	Spotted Seatrout	L	529.5	37.8	128.8	13.5399	0.9671	3.2302
13	Fringed Flounder	L	453.8	32.4	56.4	3.3133	0.2367	0.3491
14	Roughback Shrimp	L	403.6	28.8	65.0	0.3834	0.0274	0.0609
15	Gulf Menhaden	L	358.8	25.6	28.6	4.3319	0.3094	0.3837
16	Lesser Blue Crab	L	306.5	21.9	66.0	1.2148	0.0868	0.2259
17	Pigfish	L	290.3	20.7	47.3	30.9359	2.2097	4.6319
18	Atlantic Spadefish	L	257.7	18.4	32.7	10.0915	0.7208	1.5474
19	Hardhead Catfish	L	227.0	16.2	39.6	3.1875	0.2277	0.5577
20	Bay Whiff	L	224.7	16.0	33.1	2.2399	0.1600	0.3603
21	Bighead Searobin	L	222.4	15.9	33.1	8.3911	0.5994	2.0917
22	Cutlassfish	L	174.2	12.4	11.0	4.6078	0.3291	0.3903
23	Blue Crab	L	157.7	11.3	27.6	7.2746	0.5196	1.2306
24	Atlantic Bumper	L	144.7	10.3	28.9	0.5099	0.0364	0.1062
25	White Mullet	L	137.2	9.8	23.9	3.2041	0.2289	0.5143
26	Harvestfish	L	127.5	9.1	22.0	3.6296	0.2593	0.5895
27	Mantis Shrimp	L	116.6	8.3	22.1	1.7575	0.1255	0.4048
28	Parasitic Isopod	L	82.1	5.9	10.1	0.0181	0.0013	0.0026
29	Lookdown	L	75.9	5.4	8.2	0.6743	0.0482	0.0750
30	Star Drum	L	57.1	4.1	9.8	0.6015	0.0430	0.1311
31	Threadfin Shad	L	56.3	4.0	9.3	1.1967	0.0855	0.2039
32	Atlantic Stingray	L	54.2	3.9	6.8	19.8326	1.4166	3.0271
33	Spotfin Mojarra	L	47.7	3.4	7.3	0.4385	0.0313	0.0678
34	Striped Mullet	L	45.5	3.2	4.5	6.8704	0.4907	0.5622
35	Atlantic Midshipman	L	40.4	2.9	6.4	0.1972	0.0141	0.0417
36	Striped Anchovy	L	39.6	2.8	8.1	0.3922	0.0280	0.0758
37	Black Drum	L	39.0	2.8	9.2	10.1085	0.7220	1.7433
38	Iridescent Swimming Crab	L	37.3	2.7	5.4	0.2759	0.0197	0.0405
39	Sheephead	L	36.0	2.6	9.6	2.0941	0.1496	0.5597
40	Silver Jenny	L	33.4	2.4	6.1	0.2773	0.0198	0.0504
41	Gulf Butterfish	L	29.8	2.1	3.3	0.0985	0.0070	0.0147
42	Bluntnose Jack	L	25.1	1.8	3.6	0.0892	0.0064	0.0170
43	Pink Shrimp	L	24.9	1.8	4.6	0.1963	0.0140	0.0368
44	Blackcheek Tonguefish	L	17.3	1.2	4.6	0.2469	0.0176	0.0660
45	Southern Kingfish	L	16.1	1.2	4.3	3.8397	0.2743	1.0262
46	Scaled Sardine	L	14.9	1.1	2.9	0.0292	0.0021	0.0059
47	Blackwing Searobin	L	9.7	0.7	2.6	0.0400	0.0029	0.0107
48	Shrimp Eel	L	7.6	0.5	2.0	0.0061	0.0004	0.0016
49	Southern Flounder	L	5.2	0.4	1.0	1.4394	0.1028	0.2668
50	Unidentified Snapping Shrimp	L	5.2	0.4	1.4	0.0103	0.0007	0.0028
51	Bluefish	L	5.2	0.4	1.4	0.0098	0.0007	0.0026
52	Rock Sea Bass	L	3.8	0.3	0.7	0.1834	0.0131	0.0366
53	Lane Snapper	L	3.5	0.3	0.9	0.2017	0.0144	0.0539
54	Tidewater Mojarra	L	3.5	0.3	0.9	0.0283	0.0020	0.0076
55	Planehead Filefish	L	3.5	0.3	0.9	0.0276	0.0020	0.0074
56	Moonfish	L	2.9	0.2	0.8	0.0174	0.0012	0.0046
57	Lesser Rock Shrimp	L	2.9	0.2	0.8	0.0051	0.0004	0.0014
58	Red Drum	L	2.9	0.2	0.8	0.0006	0.0000	0.0002

Table 13 (continued):

DATA FOR NOVEMBER (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
59	Unidentified Mojarra	L	1.7	0.1	0.5	0.0123	0.0009	0.0033
60	Crevalle Jack	L	1.1	0.1	0.3	0.0265	0.0019	0.0071
61	Debris	L	0.0	0.0	0.0	1.2166	0.0869	0.1868
62	Unidentified Jellyfish	L	0.0	0.0	0.0	0.7248	0.0518	0.0733
63	Dimpled Hermit Crab	L	0.0	0.0	0.0	0.1084	0.0077	0.0290
64	Perverse Whelk	L	0.0	0.0	0.0	0.0332	0.0024	0.0089

1	White Shrimp	T	1763.3	881.7	489.8	4.9508	2.4754	1.4691
2	Gulf Menhaden	T	337.0	168.5	1.9	2.8915	1.4458	0.0445
3	Brown Shrimp	T	160.8	80.4	16.6	0.4391	0.2196	0.0574
4	Inshore Lizardfish	T	104.6	52.3	10.9	2.0219	1.0109	0.2679
5	Bay Anchovy	T	104.2	52.1	4.0	0.0844	0.0422	0.0015
6	Fringed Flounder	T	82.7	41.4	17.3	0.4209	0.2104	0.1197
7	Atlantic Brief Squid	T	26.6	13.3	11.5	0.0849	0.0425	0.0421
8	Atlantic Croaker	T	25.3	12.7	3.3	0.3816	0.1908	0.0372
9	Bighead Searobin	T	21.9	10.9	5.8	0.9800	0.4900	0.1296
10	Sand Seatrout	T	14.6	7.3	7.9	0.0915	0.0458	0.0526
11	Southern Kingfish	T	6.0	3.0	1.8	0.0738	0.0369	0.0439
12	Gulf Butterfish	T	6.0	3.0	1.8	0.0084	0.0042	0.0023
13	Atlantic Stingray	T	5.6	2.8	0.9	1.0207	0.5103	0.2074
14	Atlantic Bumper	T	5.6	2.8	0.9	0.0218	0.0109	0.0011
15	Bluntnose Jack	T	4.3	2.1	3.0	0.0088	0.0044	0.0062
16	Bay Whiff	T	3.9	1.9	0.3	0.0363	0.0181	0.0016
17	Hardhead Catfish	T	3.4	1.7	2.4	0.0498	0.0249	0.0352
18	Tidewater Mojarra	T	2.2	1.1	1.5	0.0124	0.0062	0.0088
19	Atlantic Spadefish	T	2.2	1.1	1.5	0.0114	0.0057	0.0080
20	Least Puffer	T	2.2	1.1	1.5	0.0105	0.0053	0.0074
21	Lesser Blue Crab	T	2.2	1.1	1.5	0.0051	0.0026	0.0036
22	Sheephead	T	1.7	0.9	1.2	2.2426	1.1213	1.5858
23	Silver Jenny	T	1.7	0.9	1.2	0.0124	0.0062	0.0087
24	Debris	T	0.0	0.0	0.0	2.1586	1.0793	1.0987
25	Unidentified Jellyfish	T	0.0	0.0	0.0	0.0474	0.0237	0.0099

Table 13 (continued):

DATA FOR NOVEMBER (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1	White Shrimp	U	300581.2	15029.1	26454.5	520.5736	26.0287	37.8233
2	Gulf Menhaden	U	38087.5	1904.4	2600.7	265.0422	13.2521	17.1467
3	Bay Anchovy	U	16405.7	820.3	1667.4	22.8237	1.1412	2.4360
4	Roughback Shrimp	U	15525.8	776.3	1437.8	11.1085	0.5554	0.9020
5	Mantis Shrimp	U	5642.4	282.1	344.9	42.0199	2.1010	2.7749
6	Sand Seatrout	U	5584.5	279.2	242.8	119.4899	5.9745	7.6647
7	Fringed Flounder	U	4058.7	202.9	194.5	26.2953	1.3148	1.3505
8	Brown Shrimp	U	4000.0	200.0	186.8	10.3056	0.5153	0.4967
9	Atlantic Croaker	U	3884.9	194.2	165.9	101.6947	5.0847	5.0020
10	Lesser Blue Crab	U	3405.8	170.3	205.5	14.4456	0.7223	0.8822
11	Atlantic Brief Squid	U	3083.8	154.2	153.5	12.3994	0.6200	0.7096
12	Bighead Searobin	U	2268.3	113.4	132.9	23.4199	1.1710	1.7484
13	Blue Crab	U	1918.8	95.9	74.1	52.7312	2.6366	1.7580
14	Hardhead Catfish	U	1307.1	65.4	91.2	13.5286	0.6764	0.8284
15	Bay Whiff	U	1150.6	57.5	47.1	8.3584	0.4179	0.3499
16	Inshore Lizardfish	U	1088.0	54.4	39.1	32.7894	1.6395	1.3059
17	Atlantic Spadefish	U	1002.3	50.1	55.0	8.9221	0.4461	0.5381
18	Red Drum	U	649.3	32.5	127.9	0.1077	0.0054	0.0184
19	Gulf Butterfish	U	624.4	31.2	40.2	1.7062	0.0853	0.1114
20	Star Drum	U	535.0	26.8	45.0	2.9433	0.1472	0.2508
21	Spot	U	528.6	26.4	48.2	10.3001	0.5150	0.7832
22	Seabob	U	465.7	23.3	58.1	0.9649	0.0482	0.1293
23	Threadfin Shad	U	395.9	19.8	40.7	5.4182	0.2709	0.5948
24	Parasitic Isopod	U	372.7	18.6	20.4	0.0606	0.0030	0.0037
25	Blackcheek Tonguefish	U	338.8	16.9	35.2	2.0901	0.1045	0.2029
26	Atlantic Midshipman	U	331.0	16.6	26.8	1.3379	0.0669	0.1301
27	Least Puffer	U	247.3	12.4	18.0	1.4332	0.0717	0.1240
28	Lined Sole	U	243.7	12.2	28.2	0.7995	0.0400	0.0961
29	Iridescent Swimming Crab	U	237.2	11.9	26.6	0.6659	0.0333	0.0737
30	Striped Mullet	U	216.5	10.8	27.8	8.6674	0.4334	0.7964
31	Silver Perch	U	200.8	10.0	15.3	4.0125	0.2006	0.2721
32	Southern Kingfish	U	138.5	6.9	9.9	2.7225	0.1361	0.2177
33	Banded Drum	U	115.1	5.8	9.4	0.3258	0.0163	0.0285
34	Pink Shrimp	U	100.7	5.0	7.9	0.3891	0.0195	0.0295
35	Cutlassfish	U	83.0	4.2	6.9	0.5592	0.0280	0.0467
36	Lookdown	U	73.4	3.7	8.2	0.3591	0.0180	0.0362
37	Spotted Seatrout	U	63.7	3.2	13.5	1.0613	0.0531	0.2131
38	Highfin Goby	U	54.6	2.7	4.8	0.3972	0.0199	0.0362
39	Hogchoker	U	36.8	1.8	3.9	0.2242	0.0112	0.0232
40	Gizzard Shad	U	30.5	1.5	5.9	0.9853	0.0493	0.1737
41	Black Drum	U	30.2	1.5	6.8	2.4586	0.1229	0.5498
42	Mud Crab	U	30.2	1.5	6.8	0.0000	0.0000	0.0000
43	Southern Stargazer	U	29.3	1.5	3.3	0.0832	0.0042	0.0107
44	Harvestfish	U	28.9	1.4	3.8	0.2092	0.0105	0.0295
45	Gafftopsail Catfish	U	28.3	1.4	3.7	1.1651	0.0583	0.1451
46	Pipefish	U	26.1	1.3	5.8	0.0365	0.0018	0.0082
47	Shrimp eel	U	21.4	1.1	3.0	2.0074	0.1004	0.2743
48	Lesser Rock Shrimp	U	19.2	1.0	2.4	0.0178	0.0009	0.0025
49	Darter Goby	U	17.5	0.9	3.0	0.0022	0.0001	0.0003
50	Southern Flounder	U	16.2	0.8	2.6	2.9738	0.1487	0.4630
51	Green Porcelain Crab	U	15.3	0.8	3.4	0.0080	0.0004	0.0018
52	Planthead Filefish	U	14.7	0.7	2.4	0.0971	0.0049	0.0171
53	Smoothhead Scorpionfish	U	14.5	0.7	2.3	0.2844	0.0142	0.0438
54	Pinfish	U	13.0	0.7	2.9	0.4212	0.0211	0.0942
55	Blackwing Searobin	U	12.2	0.6	2.7	0.3938	0.0197	0.0881
56	Bluntnose Jack	U	8.7	0.4	1.4	0.0140	0.0007	0.0022
57	Skilletfish	U	6.1	0.3	1.4	0.0933	0.0047	0.0209
58	Atlantic Stingray	U	6.0	0.3	1.3	1.8006	0.0900	0.4026

Table 13 (continued):

DATA FOR NOVEMBER (CONT.)								
		FISHING	CPUE BY NUMBER:			CPUE BY WEIGHT (Kg):		
	Common Name	ZONE	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
59	Blotched Swimming Crab	U	6.0	0.3	1.3	0.0602	0.0030	0.0135
60	Atlantic Bumper	U	5.4	0.3	1.2	0.0150	0.0007	0.0034
61	Sheephead	U	3.8	0.2	0.9	0.1752	0.0088	0.0392
62	Rock Sea Bass	U	3.8	0.2	0.9	0.1661	0.0083	0.0371
63	Debris	U	0.0	0.0	0.0	18.8896	0.9445	1.6636
64	American Oyster	U	0.0	0.0	0.0	1.2794	0.0640	0.2495
65	Atlantic Rangia	U	0.0	0.0	0.0	1.2179	0.0609	0.2723
66	Unidentified Fish	U	0.0	0.0	0.0	1.0335	0.0517	0.1728
67	Unidentified Jellyfish	U	0.0	0.0	0.0	0.4133	0.0207	0.0290
68	Unidentified Shell	U	0.0	0.0	0.0	0.1298	0.0065	0.0243
69	Unidentified	U	0.0	0.0	0.0	0.0872	0.0044	0.0116
70	Butterfish	U	0.0	0.0	0.0	0.0162	0.0008	0.0036
71	Sergestid Shrimp	U	0.0	0.0	0.0	0.0006	0.0000	0.0001

Table 14. Dominant bycatch species (by number and weight) observed during 1992 sampling efforts in Galveston Bay. Values represent percent of total bycatch attributed to individual species. Four species listed at bottom of each group are all less than 7% of total bycatch when measured individually (values reported for these species are sums).

Dominant Species By Number

	Common Name	% of Bycatch
1	Gulf Menhaden	25 %
2	Atlantic Croaker	24 %
3	Spot Croaker	7 %
4	Cutlassfish	7 %
5	Sand Seatrout	17 %
6	Bay Anchovy	
7	Atlantic Brief Squid	
8	Hardhead Catfish	

Total --> 80 %

Dominant Species By Weight

	Common Name	% of Bycatch
1	Cutlassfish	20 %
2	Atlantic Croaker	17 %
3	Gulf Menhaden	17 %
4	Sand Trout	7 %
5	Blue Crab	18 %
6	Spot	
7	Hardhead Catfish	
8	Atlantic Brief Squid	

Total --> 79 %

Table 15. Listing of large, unusual or noteworthy items which were captured in trawls during 1992. Data listed here were not used in calculating CPUE statistics which were used in data analysis and reporting. These species may or may not have been represented in the subsample but their size or presence were noteworthy and recorded as such by observers while in the field. Lengths and weights are listed whenever recorded. With respect to area, L= Lower Bay, T=Trinity Bay and U=Upper Bay.

Date	Area	Item / Scientific Name	Group / Common Name	Length (mm)	Weight (Kg)
4/7/92	L	Large Towel	Debris		5.5
4/22/92	T	Crab Trap	Debris		
5/20/92	T	Crab Trap	Debris	508	
6/25/92	L	Sack of Rice	Debris		46.0
6/25/92	L	Sack of Rice	Debris		27.0
8/21/92	U	Plastic Bucket w/Lid	Debris		4.5
9/8/92	L	Wooden Log	Debris		24.0
9/18/92	L	Wooden Board	Debris		2.5
9/24/92	L	Diesel Oil Filter	Debris		4.5
10/20/92	T	Crab Trap	Debris		3.5
10/27/92	L	Plant Debris	Debris		8.0
10/28/92	L	Plastic Bucket w/Lid	Debris		2.0
11/12/92	T	Crab Trap	Debris		
11/12/92	T	Crab Trap	Debris		
11/12/92	T	Crab Trap	Debris		
3/20/92	U	<i>Crassostrea virginica</i>	American Oyster		1.0
3/20/92	U	<i>Dasyatis sabina</i>	Atlantic Stingray		1.5
3/20/92	U	<i>Dasyatis sabina</i>	Atlantic Stingray	510	3.5
4/15/92	U	<i>Bagre marinus</i>	Gafftopsail Catfish	455	0.5
4/15/92	U	<i>Bagre marinus</i>	Gafftopsail Catfish	570	2.0
4/15/92	U	<i>Bagre marinus</i>	Gafftopsail Catfish	583	
4/15/92	U	<i>Phalacrocorax</i> spp.	Cormorant (Waterfowl)		
4/15/92	U	<i>Phalacrocorax</i> spp.	Cormorant (Waterfowl)		2.5
4/15/92	U	<i>Phalacrocorax</i> spp.	Cormorant (Waterfowl)		2.5
4/16/92	T	<i>Dasyatis sabina</i>	Atlantic Stingray	465	4.5
4/16/92	T	<i>Dasyatis sabina</i>	Atlantic Stingray	485	5.0
4/16/92	T	<i>Dasyatis sabina</i>	Atlantic Stingray	390	2.0
4/16/92	T	<i>Dasyatis sabina</i>	Atlantic Stingray	385	3.5
4/16/92	T	<i>Dasyatis sabina</i>	Atlantic Stingray	410	3.0
4/27/92	U	<i>Bagre marinus</i>	Gafftopsail Catfish	580	
4/27/92	U	<i>Dasyatis sabina</i>	Atlantic Stingray		
4/29/92	T	<i>Lepisosteus spatula</i>	Alligator Gar	770	2.5
5/14/92	T	<i>Lepisosteus spatula</i>	Alligator Gar	720	1.5
5/14/92	T	<i>Lepisosteus spatula</i>	Alligator Gar	600	1.0
5/14/92	T	<i>Lepisosteus spatula</i>	Alligator Gar	760	1.5
5/18/92	L	<i>Archosargus probatocephalus</i>	Sheephead	485	2.0
5/20/92	U	<i>Archosargus probatocephalus</i>	Sheephead	440	2.0
5/20/92	T	<i>Dasyatis sabina</i>	Atlantic Stingray	480	
5/20/92	T	<i>Lepisosteus spatula</i>	Alligator Gar	1370	17.0
5/20/92	T	<i>Sciaenops ocellatus</i>	Red Drum	508	
5/20/92	T	<i>Sciaenops ocellatus</i>	Red Drum	508	
5/20/92	T	<i>Sciaenops ocellatus</i>	Red Drum	508	
5/26/92	U	<i>Dasyatis sabina</i>	Atlantic Stingray	210	
5/26/92	U	<i>Dasyatis sabina</i>	Atlantic Stingray	285	
6/12/92	U	<i>Archosargus probatocephalus</i>	Sheephead	483	1.5
6/12/92	U	<i>Dasyatis sabina</i>	Atlantic Stingray	635	9.5
6/12/92	U	<i>Pogonias cromis</i>	Black Drum	737	4.5
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		

Table 15 (continued):

Date	Area	Scientific Name	Common Name / Group	Length (mm)	Weight (Kg)
6/12/92	U	<i>Pogonias cromis</i>	Black Drum	737	4.5
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Carcharinus limbatus</i>	Blacktip Shark		
6/18/92	L	<i>Raja eglanteria</i>	Clearnose skate		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	460	
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	<460	
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	<460	
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	<460	
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
6/18/92	L	<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark		
6/18/92	L	<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark		
6/18/92	L	<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark		
6/18/92	L	<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark		
6/18/92	L	<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark		
6/18/92	L	<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark		
6/22/92	U	<i>Archosargus probatocephalus</i>	Sheephead	510	1.0
6/30/92	L	<i>Trichiurus lepturus</i>	Cutlassfish	1160	1.5
6/30/92	L	<i>Trichiurus lepturus</i>	Cutlassfish	1140	1.5
6/30/92	L	<i>Trichiurus lepturus</i>	Cutlassfish	1150	1.0
8/20/92	U	<i>Caranx hippos</i>	Crevalle Jack	1090	16.0
8/20/92	U	<i>Paralichthys lethostigma</i>	Southern Flounder	445	
8/20/92	U	<i>Scomberomorus maculatus</i>	Spanish Mackerel	580	
8/25/92	L	<i>Menippe mercenaria</i>	Florida Stone Crab		
8/25/92	L	<i>Menippe mercenaria</i>	Florida Stone Crab		
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	310	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	435	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	490	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	330	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	325	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	355	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	310	
8/25/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray	370	
8/25/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder	570	
9/11/92	U	<i>Lobotes surinamensis</i>	Tripletail	615	
9/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		

Table 15 (continued).

Date	Area	Scientific Name	Common Name / Group	Length (mm)	Weight (Kg)
9/18/92	L	<i>Dasyatis sabina</i>	Atlantic Stingray		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder	405	
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder	460	
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder	510	
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/5/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder		
11/6/92	L	<i>Chaetodon ocellatus</i>	Spotfin Butterflyfish		
11/6/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder	625	
11/6/92	L	<i>Paralichthys lethostigma</i>	Southern Flounder	500	
11/16/92	T	<i>Cynoscion nebulosus</i>	Spotted Seatrout	425	1.0

Table 16. Ratios of shrimp to finfish and invertebrates for numbers and weights of each species group captured in shrimp trawls by month and area. Overall values based on all data.

LOWER BAY FISHING ZONE:				
	FISH TO SHRIMP:		INVERTS TO SHRIMP:	
	Number	Weight	Number	Weight
March	12.12 : 1	2.43 : 1	37.99 : 1	2.80 : 1
April	2.45 : 1	0.94 : 1	6.42 : 1	2.11 : 1
May	0.21 : 1	0.05 : 1	1.02 : 1	0.35 : 1
June	0.49 : 1	0.01 : 1	3.78 : 1	0.09 : 1
July	0.27 : 1	0.05 : 1	1.14 : 1	0.23 : 1
August	0.24 : 1	0.02 : 1	0.95 : 1	0.05 : 1
September	0.15 : 1	0.03 : 1	0.87 : 1	0.09 : 1
October	0.59 : 1	0.27 : 1	4.11 : 1	1.00 : 1
November	0.19 : 1	0.08 : 1	2.17 : 1	0.32 : 1

TRINITY BAY FISHING ZONE:				
	FISH TO SHRIMP:		INVERTS TO SHRIMP:	
	Number	Weight	Number	Weight
April	2.41 : 1	0.33 : 1	16.55 : 1	8.72 : 1
May	1.06 : 1	0.03 : 1	7.57 : 1	2.88 : 1
August	0.26 : 1	0.00 : 1	1.82 : 1	0.03 : 1
October	0.76 : 1	0.09 : 1	2.14 : 1	0.27 : 1
November	0.38 : 1	0.01 : 1	1.93 : 1	0.03 : 1

UPPER BAY FISHING ZONE:				
	FISH TO SHRIMP:		INVERTS TO SHRIMP:	
	Number	Weight	Number	Weight
March	3.00 : 1	4.90 : 1	0.20 : 1	13.28 : 1
April	4.00 : 1	14.74 : 1	0.17 : 1	18.56 : 1
May	5.00 : 1	0.58 : 1	0.05 : 1	6.62 : 1
June	6.00 : 1	0.24 : 1	0.18 : 1	2.03 : 1
July	7.00 : 1	3.63 : 1	0.76 : 1	12.11 : 1
August	8.00 : 1	1.97 : 1	0.07 : 1	3.78 : 1
September	9.00 : 1	0.69 : 1	0.09 : 1	1.60 : 1
October	10.00 : 1	0.44 : 1	0.11 : 1	1.43 : 1
November	11.00 : 1	0.26 : 1	0.10 : 1	1.28 : 1

OVERALL VALUES FOR GALVESTON BAY:				
	FISH TO SHRIMP:		INVERTS TO SHRIMP:	
	Number	Weight	Number	Weight
March	10.67 : 1	32.78 : 1	1.98 : 1	2.55 : 1
April	11.40 : 1	17.33 : 1	0.27 : 1	1.59 : 1
May	0.49 : 1	4.86 : 1	0.05 : 1	0.55 : 1
June	0.31 : 1	2.50 : 1	0.13 : 1	0.24 : 1
July	0.79 : 1	3.58 : 1	0.16 : 1	1.41 : 1
August	0.73 : 1	2.08 : 1	0.03 : 1	0.16 : 1
September	0.23 : 1	1.04 : 1	0.04 : 1	0.15 : 1
October	0.49 : 1	2.02 : 1	0.14 : 1	0.48 : 1
November	0.25 : 1	1.55 : 1	0.10 : 1	0.28 : 1
Overall Values for March - November 1992				
Sampling Period -->	0.53 : 1	2.64 : 1	0.09 : 1	0.39 : 1

Table 17. Estimated bycatch of finfish and invertebrates based on 1992 landings. Values for finfish and invertebrates are extrapolated based on the ratios of shrimp to finfish and invertebrates obtained from new sampling efforts in 1992.

MONTH	Actual Shrimp Landings (kg)	Fish:Shrimp Ratio By Weight	Estimated Fish Catch (kg)	Invert:Shrimp Ratio By Weight	Estimated Invert Catch (kg)	Estimated Total Catch of Fish & Inverts (kg)
March	3,432	32.78 : 1	112,506.3	2.55 : 1	8,759.6	121,265.9
April	20,612	17.33 : 1	357,225.1	1.59 : 1	32,821.6	390,046.6
May	175,696	4.86 : 1	853,738.0	0.55 : 1	96,717.7	950,455.8
June	324,889	2.50 : 1	812,636.0	0.24 : 1	79,470.4	892,106.4
July	243,451	3.58 : 1	871,074.7	1.41 : 1	344,203.5	1,215,278.2
August	252,078	2.08 : 1	525,099.8	0.16 : 1	41,141.5	566,241.3
September	173,105	1.04 : 1	180,528.3	0.15 : 1	25,844.0	206,372.2
October	140,906	2.02 : 1	284,250.6	0.48 : 1	68,053.9	352,304.5
November*	67,873	1.55 : 1	105,003.3	0.28 : 1	18,845.9	123,849.2
Overall -->	1,402,043	2.64 : 1	3,701,393.5	0.39 : 1	546,796.8	4,248,190.3

* - Landings for November 1992 are estimated; statistical data for this month not yet verified.

V. COMPARISON WITH TPWD FISHERY INDEPENDENT SURVEYS

METHODS

The Texas Parks and Wildlife Department (TPWD) routinely monitors the abundance of estuarine organisms in Texas bay systems each month. They have divided Galveston Bay into 756 sampling grid areas from which trawl samples can be taken. Each month TPWD takes one trawl sample from each of 20 - 26 randomly selected grid areas in Galveston Bay. Sampling is conducted from either a 35.1-m or a 41.5-m research vessel; organisms are always collected with a 18.5-m (20') otter trawl during a 10 minute tow. Group weights for individuals of each species within the tow sample are recorded; individual weights were not measured. Lengths were measured for most of the individuals within the sample (Brenda Bowling, TPWD, personal communication). A detailed account of sampling methodologies used by TPWD is provided reported by Rice et al. (1988) and Dailey et al. (1991).

Survey data were obtained from TPWD for samples collected in Galveston Bay during March-October 1992. Since the purpose of this analysis was to compare the fishery-independent survey data collected by TPWD from a research vessel with the fishery-dependent bycatch data collected by NMFS from active shrimp vessels, CPUE values from the TPWD data set (number per 10 minute tow from a 18.5-m trawl) were linearly extrapolated to the level of the NMFS data set (number per hour for a 29.5-m trawl, March - July; number for a 40.6-m trawl, August - October). Three statistical comparisons were performed on the standardized data for selected species of the NMFS and TPWD data sets: a Kolmogorov-Smirnov test on the length frequency data, a Student t-test on CPUE values and a linear regression on the fish:shrimp and invertebrate:shrimp ratios (Snedecor and Cochran 1967). The Kolmogorov-Smirnov test compares the length frequency distributions of individual species from two treatments (NMFS vs. TPWD data). These species included Atlantic croaker, bay anchovy, black drum, blue crab, Atlantic brief squid, brown shrimp, cutlassfish, gulf menhaden, hardhead catfish, pink shrimp, red drum, roughback shrimp, sand seatrout, southern flounder, spot, spotted seatrout, and white shrimp.

Student t-tests were conducted for statistical comparison of the species-specific monthly CPUE values. All species which occur in both data sets were analyzed using this method. Fifty-three species were tested. Pooled variances from each data set were used during this analysis to test for significant differences in CPUE values.

A third statistical comparison between the two data sets was conducted using linear regression. This was a comparison of the number of finfish to the number of shrimp (finfish to shrimp ratio) and the number of invertebrates to the number of shrimp (invertebrate to shrimp ratio). Only the three penaeid shrimp species (brown shrimp, white shrimp and pink shrimp) were used in the shrimp category. All other invertebrates (non-penaeid species), except ctenophores and other jellyfish were grouped into the invertebrate category. All statistical comparisons and analyses

were performed using Systat 5.1 (Systat, Inc., Evanston, IL) statistical analysis software for MacIntosh computers.

RESULTS AND DISCUSSION

During March-October 1992, TPWD collected a total of 79 different species during trawl surveys in Galveston Bay (Table 18). Twelve species were found in at least one trawl per month, whereas only 7 species were found in at least one trawl sample in all months (except one). The 12 species found every month included Atlantic croaker, bay anchovy, blue crab, brown shrimp, gulf menhaden, hardhead catfish, least puffer, pinfish, sand seatrout, spot, threadfin shad, and white shrimp; the seven species found in all but one month included Atlantic spadefish, Atlantic stingray, American oyster, bighead searobin, cutlassfish, daggerblade grass shrimp, and hermit crabs. Surveys conducted during the month of May recorded the most species (50), followed by June and October (44 each), September (41), July (40), August (36), April (34) and March (31).

Kolmogorov-Smirnov Test

Species utilized in the length frequency analysis (Table 19) included bay anchovy, hardhead catfish, gulf menhaden, blue crab, sand seatrout, spot, spotted seatrout, Atlantic croaker, Atlantic brief squid, cutlassfish, and roughback, brown, white and pink shrimp. Southern flounder, black drum and red drum data from TPWD surveys were insufficient for statistical comparison with data from 1992 NMFS study. Significant differences among the two data sets (as detected by the Kolmogorov-Smirnov test) indicate that the length-frequency distributions are not comparable. Consequently, even if CPUE data for a given species are similar, the difference in size composition would prevent using TPWD data as an indicator of bycatch magnitude (based on NMFS samples).

For bay anchovy, significant differences among length-frequency distributions were found in March, April and July. In testing hardhead catfish, all months except May resulted in significant differences. No significant differences were found for gulf menhaden during July, September and October. For blue crab, no significant differences were observed in April, August, September and October. Significant differences in the length distributions of sand seatrout occurred during May, July and September.

Only data from March and May could be examined for spotted seatrout. For both months, no significant differences were found between length distributions (NMFS vs. TPWD data). A significant difference was found among all the monthly length distributions for spot. Brief squid could only be tested for 6 of the 8 months. During these 6 comparisons, all but one month (July) produced significant differences among length distributions. For Atlantic croaker, all months, except May indicated significant difference between length frequency distributions.

Brown and white shrimp comparisons maintained significant differences among the length-frequency distributions for all months. Pink shrimp could only be tested for October; no significant difference was observed between length data. Roughback shrimp could only be tested for September; results indicated a significant difference between length-frequency distributions. There were sufficient data on cutlassfish for 5 monthly tests. Three of these tests (May, June and August) produced test values that showed no significant difference between length distributions.

Student T-Test

A total of 53 species were included in the CPUE comparison tests (Table 20). Four of these species (Atlantic croaker, bay anchovy, sand seatrout, and cutlassfish) had mean CPUE values which were significantly different during each month. Twenty-five other species had mean CPUE values which were not significantly different during each month (Atlantic bumper, Atlantic midshipman, Atlantic stingray, Atlantic threadfin, black drum, crevalle jack, daggerblade grass shrimp, gray snapper, gulf butterfish, gulf toadfish, hogchoker, ladyfish, lesser blue crab, lookdown, pigfish, pinfish, pink shrimp, sheephead, silver jenny, silver perch, silver seatrout, southern kingfish, southern hake, spotted seatrout, star drum). However, 10 of these species (black drum, gray snapper, ladyfish, pink shrimp, sheephead, silver jenny, silver seatrout, southern kingfish, southern hake, and star drum) were each found during only one of the eight months. All other 24 species had mean CPUE values which were significantly different some months but not for others (Atlantic spadefish, bay whiff, bighead searobin, blue catfish, blue crab, bluntnose jack, Atlantic brief squid, brown shrimp, cutlassfish, fringed flounder, gafftopsail catfish, gizzard shad, gulf menhaden, hardhead catfish, harvestfish, inshore lizardfish, least puffer, mantis shrimp, Ohio shrimp, Spanish mackerel, spot, striped mullet, threadfin shad, and white shrimp). For shrimp, differences in CPUE were detected in all months but April for brown shrimp, and all months except June and July for white shrimp. White shrimp CPUE values in June and July were significantly different at the 90% level of significance ($\alpha = 0.1$).

Most of the monthly mean CPUE values (species-specific) that were obtained from NMFS fishery-dependent trips were greater than those obtained from TPWD fishery-independent trips. This observation was consistent for most species during most months.

Linear Regression

For data collected by TPWD, ratios of finfish to shrimp and invertebrates to shrimp (number of organisms by area and month) are provided in Table 21 and Figures 36-37. During most months, in each area, finfish catches in TPWD trawl samples outnumbered shrimp catches. Ratios varied from 42 times greater number of fish (compared to shrimp) in August Lower Bay samples, to about half (0.632) during September Upper Bay samples. During most months there were more shrimp than

invertebrates collected in trawl samples. Exceptions were during August and October in the Lower Bay, October in Trinity Bay, and March in the Upper Bay.

NMFS and TPWD ratio data were compared using NMFS ratios as the dependent and TPWD ratios as the independent during linear regression analysis (Table 22). Results indicated that TPWD fish and invertebrate ratios are not comparable with NMFS fish and invertebrate ratios for each of the three bay areas.

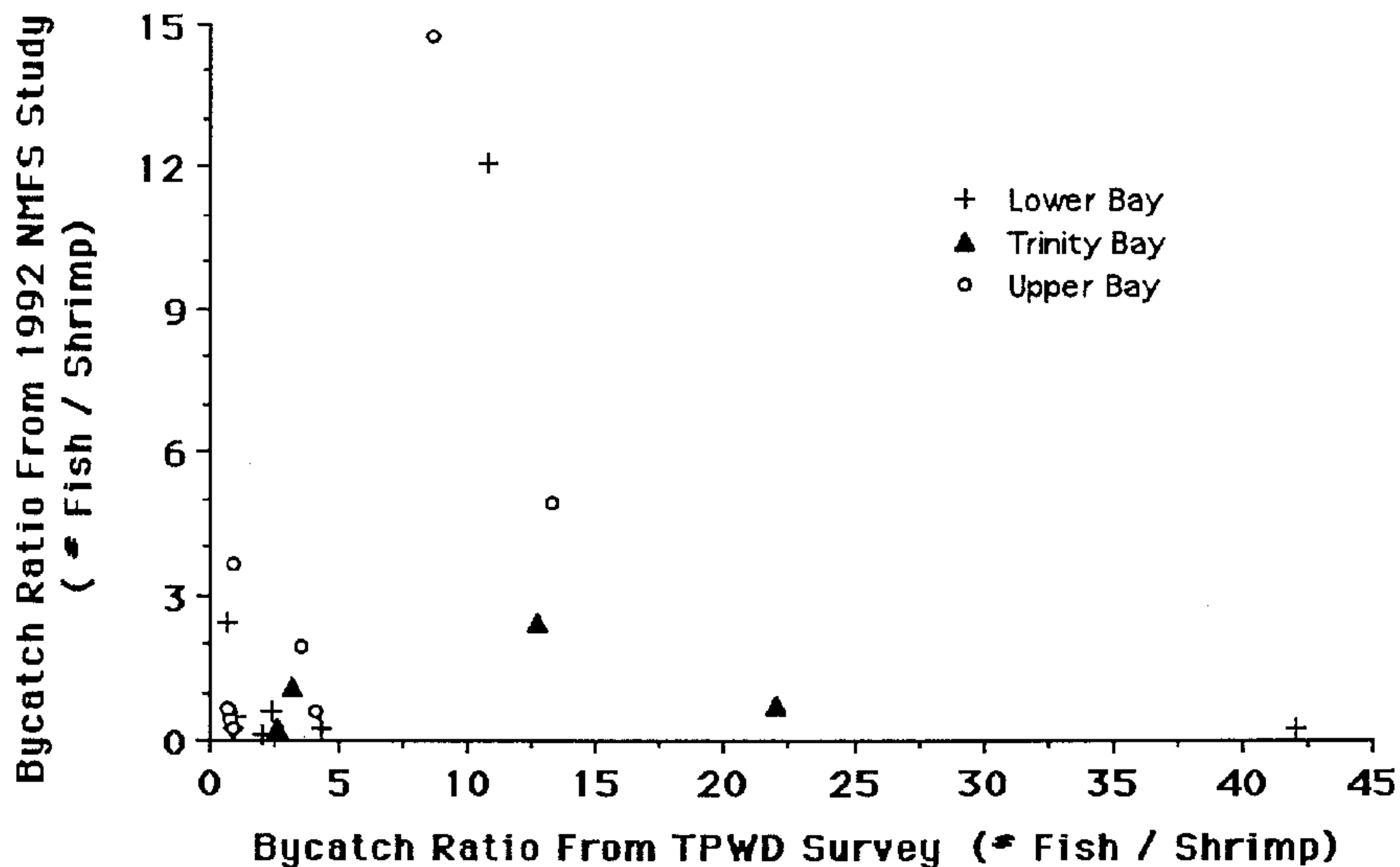


Figure 37. Plot of finfish : shrimp ratios for the three fishing zones sampled during May - November 1992 (Lower Bay, Trinity Bay, Upper Bay).

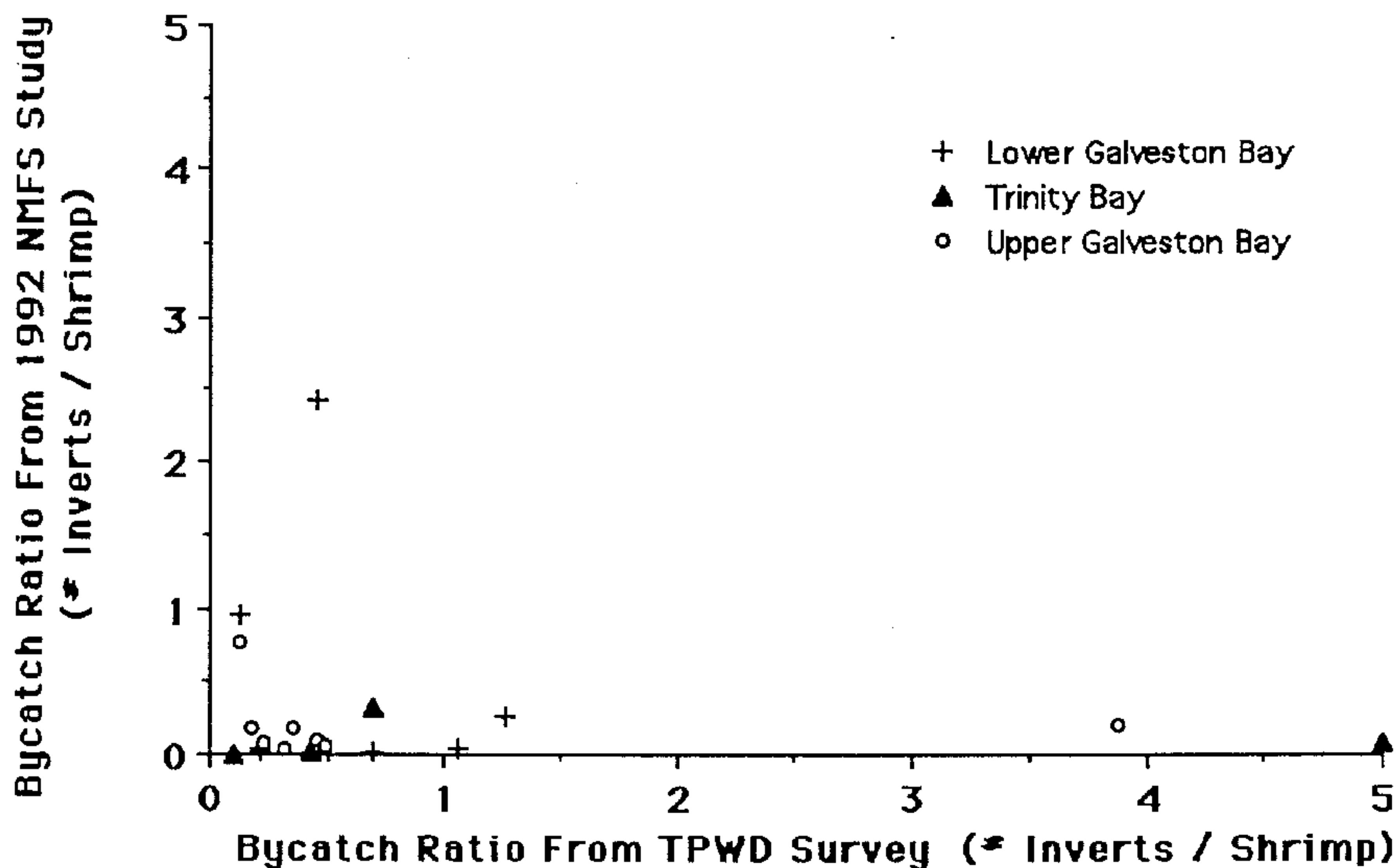


Figure 38. Plot of invertebrate : shrimp ratios for the three fishing zones sampled during May - November 1992 (Lower Bay, Trinity Bay, Upper Bay)

Table 18. Listing of individual species captured in fishery independent trawl surveys conducted by the Texas Parks and Wildlife Department (79 species total). Plus (+) symbols indicate presence in Galveston Bay during specified month. Monthly total are provided at bottom of table. Common names follow American Fisheries Society guidelines (Turgeonet al. 1988, Williams et al. 1988, Robins et al. 1991).

COMMON NAME	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
American Oyster		+	+	+	+	+	+	+
Atlantic Brief Squid			+	+	+	+	+	+
Atlantic Bumper			+	+	+	+	+	+
Atlantic Croaker	+	+	+	+	+	+	+	+
Atlantic Midshipman	+	+	+	+	+		+	
Atlantic Rangia					+	+	+	+
Atlantic Spadefish	+	+	+		+	+	+	+
Atlantic Stingray	+	+	+	+		+	+	+
Atlantic Threadfin			+	+				
Bay Anchovy	+	+	+	+	+	+	+	+
Bay Whiff		+	+	+	+		+	+
Bigeye Searobin			+	+	+		+	
Bighead Searobin	+	+	+	+	+	+	+	
Black Drum	+		+					
Blue Catfish	+	+	+	+				
Blue Crab	+	+	+	+	+	+	+	+
Bluntnose Jack						+	+	+
Bluntnose Stingray				+				
Brown Rangia			+	+	+	+	+	
Brown Shrimp	+	+	+	+	+	+	+	+
Cannonball Jellyfish							+	
Chain Pipefish			+					
Comb Jellyfish			+				+	
Common carp				+				
Creville Jack						+	+	
Cutlassfish		+	+	+	+	+	+	+
Daggerblade Grass Shrimp	+	+	+					
Flatback Mud Crab	+		+			+		
Flatclaw Hermit Crab				+	+			
Florida Rocksnail		+	+		+			
Fringed Flounder	+	+	+	+	+	+	+	+
Gafftopsail Catfish	+	+	+		+	+		+
Gizzard Shad	+		+	+	+	+	+	
Gray Snapper								+
Gulf Butterfish		+			+			
Gulf Menhaden	+	+	+	+	+	+	+	+
Gulf Stone Crab			+	+				
Gulf Toadfish			+		+			+
Hardhead Catfish	+	+	+	+	+	+	+	+
Harris Mud Crab	+							
Harvestfish			+	+	+	+	+	+
Hogchoker			+	+	+			+
Inshore Lizardfish			+	+		+	+	+
Iridescent Swimming Crab						+		
Ladyfish						+		
Least Puffer	+	+	+	+	+	+	+	+
Lesser Blue Crab		+	+	+			+	+
Lookdown					+		+	+
Mantis Shrimp				+	+		+	+
Moonfish						+	+	+

Table 18 (continued):

COMMON NAME	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Ocellated Flounder		+		+	+			
Ohio Shrimp	+	+	+	+				
Pigfish		+	+					
Pinfish	+	+	+	+	+	+	+	+
Pink Shrimp								+
Portly Spider Crab			+		+			
Red Drum				+				
Roughback Shrimp							+	+
Sand Seatrout	+	+	+	+	+	+	+	+
Sargassum Shrimp	+							
Sea Nettle				+		+	+	+
Shark Eye Mollusk		+						+
Sheephead	+							+
Silver Jenny								+
Silver Perch	+	+	+					+
Silver Seatrout				+			+	+
Smooth Mud Crab			+					
Southern Flounder	+	+	+	+	+	+		+
Southern Hake		+						
Southern Kingfish			+					
Spanish Mackerel					+	+		+
Spot	+	+	+	+	+	+	+	+
Spotted Gar				+				
Spotted Seatrout	+		+					
Star Drum								+
Striped Mullet	+		+	+	+		+	
Thinstripe Hermit Crab		+	+	+	+	+	+	+
Threadfin Shad	+	+	+	+	+	+	+	+
White Shrimp	+	+	+	+	+	+	+	+
TOTALS:	31	34	50	44	40	36	41	44

Table 19. Comparison and statistical analysis of length-frequency distributions for NMFS and TPWD bycatch data. Min., max., mean and std. dev. values refer to total length (mm). P-values from Kolmogorov-Smirnov analyses on length-frequency distributions of NMFS and TPWD data. Significant differences are observed among length-frequency distributions from both datasets if p-value is ≤ 0.05 .

COMMON NAME	MONTH	NMFS DATA					TPWD DATA					P-VALUES
		CASES	MIN.	MAX.	MEAN	STD. DEV.	CASES	MIN.	MAX.	MEAN	STD. DEV.	
Atlantic Brief Squid	MAY	237	11	80	47.86	13.04	54	18	76	54.65	10.08	0.00
	JUN	162	12	80	43.94	14.08	62	34	82	60.55	12.04	0.00
	JUL	399	12	86	36.28	14.38	12	22	47	35.00	8.49	0.82
	AUG	231	11	78	36.03	11.75	23	14	76	43.91	13.38	0.01
	SEP	573	13	99	43.43	14.65	16	15	70	50.81	15.78	0.03
	OCT	827	15	95	44.59	14.40	165	15	96	50.03	16.81	0.00
Atlantic Croaker	MAR	125	25	190	79.36	25.81	364	22	212	116.57	43.04	0.00
	APR	742	26	197	85.23	30.94	308	30	215	112.25	40.75	0.00
	MAY	913	40	218	107.55	34.18	314	33	198	105.91	33.34	0.10
	JUN	927	48	244	98.40	28.20	321	42	225	104.60	37.40	0.00
	JUL	1021	47	225	100.42	27.66	171	64	248	103.49	33.03	0.01
	AUG	626	73	231	100.18	20.81	89	76	246	110.21	34.29	0.00
	SEP	735	81	257	115.74	23.65	123	38	229	112.98	24.51	0.00
	OCT	818	83	227	124.19	22.28	142	96	182	132.60	15.33	0.00
Bay Anchovy	MAR	110	30	91	56.95	13.68	16	27	76	45.69	14.53	0.00
	APR	382	28	91	62.40	17.91	21	26	87	44.67	14.92	0.00
	MAY	328	23	87	49.81	12.37	54	33	82	48.52	10.78	0.66
	JUN	360	20	85	44.53	12.31	33	23	75	43.55	10.96	0.75
	JUL	470	23	85	39.62	12.37	32	25	71	34.72	9.24	0.02
	AUG	370	23	72	40.44	7.27	21	33	63	40.52	6.52	0.12
	SEP	455	25	70	43.28	9.14	4	38	70	50.25	13.77	0.51
	OCT	530	26	78	52.13	9.47	30	38	71	52.17	8.05	0.42
Blue Crab	MAR	110	17	180	60.26	36.69	143	20	170	66.83	28.30	0.00
	APR	347	19	178	59.62	31.98	47	21	161	62.09	32.97	0.57
	MAY	347	17	197	74.29	38.34	146	16	159	74.74	31.14	0.02
	JUN	479	17	187	70.89	33.94	173	26	182	84.86	38.00	0.00
	JUL	506	22	185	83.70	38.16	68	25	195	94.49	43.71	0.01
	AUG	173	29	191	80.14	35.95	3	60	150	119.00	51.12	0.33
	SEP	257	32	183	78.34	31.23	42	33	171	77.33	33.64	0.78
	OCT	231	34	167	78.87	30.97	18	33	159	76.00	39.91	0.21

Table 19 (continued):

COMMON NAME	MONTH	NMFS DATA					TPWD DATA					P-VALUES
		CASES	MIN.	MAX.	MEAN	STD. DEV.	CASES	MIN.	MAX.	MEAN	STD. DEV.	
Brown Shrimp	MAR	53	46	70	58.04	5.80	5	64	96	81.80	13.61	0.00
	APR	228	18	80	44.88	18.10	149	39	141	85.11	19.65	0.00
	MAY	921	22	75	43.39	8.15	263	42	119	79.08	14.08	0.00
	JUN	928	27	86	43.85	6.79	651	42	140	80.38	15.05	0.00
	JUL	1002	22	87	46.99	7.36	280	28	135	85.76	12.74	0.00
	AUG	520	25	86	44.95	7.53	4	61	105	81.50	18.50	0.00
	SEP	758	22	74	45.21	6.35	348	55	157	81.95	10.11	0.00
	OCT	587	28	69	50.68	5.53	72	35	115	85.96	16.48	0.00
Cutlassfish	APR	357	159	447	318.00	38.17	11	269	370	298.82	27.08	0.02
	MAY	684	180	585	389.56	45.48	5	378	415	395.40	15.47	0.45
	JUN	459	160	625	443.87	75.43	4	222	428	373.00	100.72	0.62
	JUL	550	98	605	303.03	94.56	8	120	311	225.75	53.81	0.02
	AUG	88	253	626	373.19	78.74	3	178	505	352.33	164.57	0.94
Gulf Menhaden	MAR	105	43	249	109.81	31.69	78	33	237	121.90	43.36	0.00
	APR	604	25	258	120.11	39.84	96	32	242	103.74	40.93	0.00
	MAY	563	27	258	101.66	32.10	28	33	144	82.61	37.47	0.00
	JUN	495	43	239	101.83	30.62	81	33	256	109.85	34.58	0.00
	JUL	691	42	206	95.21	22.79	67	50	147	90.22	20.88	0.22
	AUG	581	54	165	92.94	17.15	41	74	164	109.27	16.78	0.00
	SEP	359	65	176	104.23	16.97	59	75	208	104.09	19.72	0.53
	OCT	585	71	204	108.47	19.71	20	87	216	114.50	27.45	0.75
Hardhead Catfish	MAR	26	89	275	130.15	48.71	50	95	378	171.00	52.60	0.00
	APR	366	81	353	130.98	48.37	30	101	345	192.87	56.42	0.00
	MAY	249	45	377	143.17	49.68	5	102	172	134.00	28.82	0.98
	JUN	278	100	393	143.95	49.86	51	112	391	190.92	64.94	0.00
	JUL	351	25	354	110.04	57.96	90	50	322	185.49	80.86	0.00
	AUG	378	56	284	98.74	42.39	29	60	345	215.28	81.37	0.00
	SEP	415	64	347	92.55	32.73	26	71	251	158.65	51.08	0.00
	OCT	316	55	328	118.39	39.51	72	80	352	150.21	80.29	0.00
Pink Shrimp	OCT	4	53	70	59.25	7.59	2	50	56	53.00	4.24	1.00

Table 19 (continued):

COMMON NAME	MONTH	NMFS DATA					TPWD DATA					P-VALUES
		CASES	MIN.	MAX.	MEAN	STD. DEV.	CASES	MIN.	MAX.	MEAN	STD. DEV.	
Sand Seatrout	MAR	105	75	177	112.12	16.03	2	105	157	131.00	36.77	1.00
	APR	460	22	210	115.18	35.01	10	37	162	120.00	39.74	0.36
	MAY	522	21	210	92.02	37.81	63	44	184	120.86	42.26	0.00
	JUN	744	26	238	103.51	25.03	142	29	221	106.75	37.63	0.06
	JUL	836	20	252	97.39	33.40	41	56	230	115.73	35.04	0.02
	AUG	442	39	219	117.65	31.22	16	84	230	123.50	38.75	0.53
	SEP	587	25	253	116.87	39.66	18	79	210	142.61	32.05	0.00
	OCT	659	33	269	130.74	45.68	41	47	265	136.68	52.48	0.60
Spot	MAR	16	114	192	134.88	19.95	58	122	248	146.12	18.04	0.01
	APR	208	54	240	105.58	38.22	47	54	208	125.09	43.86	0.00
	MAY	199	59	230	88.16	21.36	57	59	211	93.67	25.62	0.01
	JUN	428	57	170	91.66	11.60	139	76	182	98.55	15.31	0.00
	JUL	626	52	207	96.45	16.91	58	73	148	103.79	12.90	0.00
	AUG	385	26	187	105.47	17.04	47	99	172	114.55	11.64	0.00
	SEP	262	84	196	116.56	14.79	75	105	147	122.79	9.82	0.00
	OCT	184	92	228	128.46	16.19	54	105	225	136.50	27.42	0.00
Spotted Seatrout	MAR	7	111	150	129.57	16.52	15	109	200	150.20	24.97	0.14
	MAY	11	159	246	200.82	23.12	3	184	211	195.67	13.87	0.98
Roughback Shrimp	SEP	107	13	39	30.62	5.96	3	50	60	55.00	5.00	0.00
White Shrimp	MAR	125	33	86	53.96	11.24	127	62	131	85.66	10.92	0.00
	APR	728	34	91	61.55	8.66	182	37	145	98.63	14.05	0.00
	MAY	707	43	97	75.56	7.30	76	54	142	117.07	17.42	0.00
	JUN	376	25	105	66.80	23.86	28	39	159	99.21	38.57	0.00
	JUL	909	27	97	50.77	10.39	225	57	135	96.49	13.56	0.00
	AUG	696	35	87	59.69	9.74	102	66	140	109.09	14.69	0.00
	SEP	901	21	110	59.48	11.89	213	62	151	99.54	16.06	0.00
	OCT	999	28	96	62.92	10.85	250	68	153	105.96	15.68	0.00

Table 20. Catch per unit effort for each species during 1992 NMFS sampling and TPWD fishery independent surveys. P-values are from Student's t-test comparing numerical CPUE from NMFS vs. TPWD data. Values less than 0.05 are significantly different at the 95% level of significance.

DATA FOR MARCH 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Croaker	5	3396.27	3835.48	26	611.08	1011.91	0.00
Atlantic Spadefish	5	55.67	69.93	26	2.22	5.64	0.00
Bay Anchovy	5	234.57	275.09	26	5.91	9.04	0.00
Bighead Searobin	5	113.84	144.00	26	2.59	5.12	0.00
Blue Crab	5	149.42	70.15	26	143.26	361.93	0.97
Brown Shrimp	5	57.66	47.31	26	2.22	5.64	0.00
Daggerblade Grass Shrimp	5	0.61	1.36	26	1.11	3.13	0.73
Fringed Flounder	5	4.53	6.81	26	0.37	1.88	0.01
Gafftopsail Catfish	5	1.26	2.82	26	0.37	1.88	0.38
Gizzard Shad	5	0.73	1.63	26	0.37	1.88	0.69
Gulf Menhaden	5	840.71	517.74	26	36.55	75.35	0.00
Hardhead Catfish	5	33.12	35.28	26	18.46	24.73	0.27
Least Puffer	5	1.99	2.88	26	4.06	10.58	0.67
Sand Seatrout	5	232.48	317.04	26	0.74	3.77	0.00
Silver Perch	5	3.45	5.01	26	0.74	3.77	0.17
Spot	5	16.07	11.20	26	25.85	63.84	0.74
Spotted Seatrout	5	4.27	9.55	26	5.54	11.25	0.82
Threadfin Shad	5	1300.67	2704.36	26	0.37	1.88	0.01
White Shrimp	5	560.05	245.12	26	55.39	112.75	0.00

Table 20 (continued):

DATA FOR APRIL 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Croaker	30	3818.68	6122.64	26	203.45	279.95	0.00
Atlantic Midshipman	30	3.88	11.41	26	1.11	3.13	0.24
Atlantic Spadefish	30	2.04	5.54	26	6.28	24.43	0.36
Bay Anchovy	30	351.14	547.53	26	8.12	19.52	0.00
Bay Whiff	30	0.79	2.82	26	0.74	2.61	0.95
Bighead Searobin	30	11.73	28.61	26	1.11	4.14	0.07
Blue Catfish	30	123.97	214.48	26	193.48	573.70	0.54
Blue Crab	30	82.74	109.89	26	17.72	24.54	0.01
Brown Shrimp	30	61.86	97.48	26	103.02	309.41	0.49
Cutlassfish	30	331.80	609.80	26	4.06	15.16	0.01
Daggerblade Grass Shrimp	30	0.37	2.05	26	1.85	6.08	0.22
Fringed Flounder	30	0.55	1.87	26	0.37	1.88	0.73
Gafftopsail Catfish	30	7.51	19.80	26	0.74	3.77	0.09
Gulf Butterfish	30	3.96	14.68	26	2.59	10.00	0.69
Gulf Menhaden	30	3422.26	10338.04	26	50.95	101.44	0.10
Hardhead Catfish	30	93.73	127.37	26	11.08	19.90	0.00
Least Puffer	30	1.35	4.94	26	1.11	3.13	0.83
Ohio Shrimp	30	52.30	66.85	26	13.66	34.04	0.01
Pigfish	30	0.47	2.58	26	0.37	1.88	0.87
Pinfish	30	0.64	2.27	26	0.37	1.88	0.64
Sand Seatrout	30	171.61	217.28	26	3.69	13.32	0.00
Silver Perch	30	2.08	6.78	26	2.59	9.23	0.82
Southern Hake	30	9.64	26.92	26	1.48	4.46	0.13
Spot	30	78.22	166.20	26	18.09	47.60	0.81
Threadfin Shad	30	122.89	291.69	26	1.85	3.86	0.04
White Shrimp	30	685.06	610.33	26	67.94	114.56	0.00

Table 20 (continued):

DATA FOR MAY 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Brief Squid	36	190.93	513.84	26	19.94	46.23	0.10
Atlantic Croaker	36	1487.79	2344.18	26	292.06	375.09	0.01
Atlantic Midshipman	36	4.85	14.27	26	5.17	14.68	0.93
Atlantic Spadefish	36	20.16	77.92	26	5.91	15.85	0.36
Atlantic Threadfin	36	0.13	0.79	26	0.37	1.88	0.50
Bay Anchovy	36	66.33	89.66	26	21.42	35.02	0.02
Bay Whiff	36	2.13	6.61	26	13.29	42.07	0.12
Bighead Searobin	36	5.34	12.15	26	0.74	2.61	0.06
Black Drum	36	0.06	0.38	26	0.37	1.88	0.34
Blue Catfish	36	118.84	291.88	26	3.32	8.98	0.05
Blue Crab	36	102.18	151.55	26	67.57	142.40	0.37
Brown Shrimp	36	7813.45	9822.45	26	444.19	1368.46	0.00
Cutlassfish	36	1210.32	2495.05	26	1.85	4.72	0.02
Fringed Flounder	36	0.56	1.97	26	29.54	112.28	0.13
Gafftopsail Catfish	36	0.46	2.10	26	6.28	22.38	0.13
Gizzard Shad	36	29.50	54.48	26	0.37	1.88	0.01
Gulf Menhaden	36	689.74	1097.08	26	10.71	20.20	0.00
Gulf Toadfish	36	0.98	4.15	26	1.85	4.72	0.45
Hardhead Catfish	36	75.62	209.26	26	1.85	3.86	0.08
Harvestfish	36	4.61	10.81	26	0.37	1.88	0.05
Hogchoker	36	0.70	3.09	26	0.74	3.77	0.96
Inshore Lizardfish	36	6.38	25.42	26	0.37	1.88	0.23
Least Puffer	36	2.13	6.07	26	1.85	5.44	0.85
Lesser Blue Crab	36	1.26	4.53	26	1.11	4.14	0.89
Ohio Shrimp	36	7.05	17.88	26	1.48	3.53	0.12
Pigfish	36	3.21	10.29	26	0.37	1.88	0.17
Pinfish	36	11.72	38.37	26	0.37	1.88	0.14
Sand Seatrout	36	128.76	140.01	26	23.26	44.47	0.00
Silver Perch	36	0.49	2.16	26	2.59	13.18	0.35
Southern Kingfish	36	0.82	4.90	26	0.37	1.88	0.66
Spot	36	54.24	120.26	26	88.62	292.92	0.53
Spotted Seatrout	36	0.98	2.48	26	1.11	3.13	0.85
Striped Mullet	36	0.54	2.01	26	0.37	1.88	0.74
Threadfin Shad	36	21.49	59.03	26	1.11	3.13	0.08
White Shrimp	36	260.72	312.70	26	28.43	52.19	0.00

Table 20 (continued):

DATA FOR JUNE 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Brief Squid	37	60.53	105.73	26	24.37	51.82	0.11
Atlantic Bumper	37	5.90	19.91	26	1.48	7.53	0.29
Atlantic Croaker	37	988.05	1018.01	26	308.68	535.56	0.00
Atlantic Midshipman	37	11.18	27.89	26	1.11	3.13	0.07
Atlantic Stingray	37	2.29	8.27	26	0.37	1.88	0.25
Atlantic Threadfin	37	3.87	10.53	26	0.37	1.88	0.10
Bay Anchovy	37	98.96	124.01	26	12.55	22.52	0.00
Bay Whiff	37	27.77	47.43	26	8.12	16.45	0.05
Bighead Searobin	37	6.24	10.81	26	1.85	4.72	0.06
Blue Catfish	37	0.95	4.29	26	10.71	35.33	0.10
Blue Crab	37	148.56	193.20	26	63.88	73.96	0.04
Brown Shrimp	37	13113.70	12864.81	26	548.68	899.88	0.00
Cutlassfish	37	306.54	479.80	26	1.48	3.53	0.00
Fringed Flounder	37	3.60	7.94	26	16.62	38.45	0.05
Gizzard Shad	37	3.79	9.06	26	0.74	2.61	0.10
Gulf Menhaden	37	504.09	880.59	26	29.91	37.36	0.01
Hardhead Catfish	37	53.18	66.97	26	18.83	29.93	0.02
Harvestfish	37	42.06	76.89	26	16.25	26.57	0.11
Hogchoker	37	2.82	10.63	26	1.85	6.66	0.68
Inshore Lizardfish	37	15.21	32.67	26	0.37	1.88	0.02
Least Puffer	37	14.36	25.12	26	1.11	4.14	0.01
Lesser Blue Crab	37	19.34	58.51	26	1.48	4.46	0.13
Mantis Shrimp	37	1.69	5.31	26	2.22	6.26	0.72
Ohio Shrimp	37	1.67	7.88	26	1.85	4.72	0.92
Pinfish	37	18.04	77.90	26	4.80	20.90	0.40
Sand Seatrout	37	447.41	540.20	26	54.65	70.74	0.00
Silver Seatrout	37	14.67	38.69	26	0.37	1.88	0.07
Spot	37	1507.79	3056.75	26	60.55	92.83	0.02
Striped Mullet	37	1.41	4.21	26	1.48	5.88	0.96
Threadfin Shad	37	21.75	52.62	26	3.32	5.39	0.08
White Shrimp	37	352.21	1006.00	26	10.34	16.50	0.09

Table 20 (continued):

DATA FOR JULY 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Brief Squid	42	119.76	189.41	20	5.76	16.89	0.01
Atlantic Bumper	42	1.81	5.67	20	0.48	2.15	0.32
Atlantic Croaker	42	504.95	717.86	20	134.88	211.44	0.03
Atlantic Midshipman	42	29.92	80.78	20	0.96	2.96	0.12
Atlantic Spadefish	42	6.76	11.43	20	0.96	4.29	0.03
Bay Anchovy	42	197.85	316.89	20	15.36	23.18	0.01
Bay Whiff	42	65.45	141.98	20	1.44	3.52	0.05
Bighead Searobin	42	11.61	23.09	20	0.48	2.15	0.04
Blue Crab	42	160.40	216.36	20	32.64	53.17	0.01
Brown Shrimp	42	1853.50	3530.64	20	159.84	251.85	0.04
Cutlassfish	42	171.12	187.96	20	3.84	9.03	0.00
Fringed Flounder	42	26.53	45.67	20	2.40	6.13	0.02
Gafftopsail Catfish	42	99.84	120.94	20	1.44	3.52	0.00
Gizzard Shad	42	15.46	49.24	20	0.48	2.15	0.18
Gulf Butterfish	42	0.33	1.73	20	0.96	4.29	0.41
Gulf Menhaden	42	290.81	429.20	20	39.84	81.18	0.01
Gulf Toadfish	42	3.03	10.63	20	0.96	2.96	0.40
Hardhead Catfish	42	89.01	103.64	20	81.12	172.42	0.82
Harvestfish	42	47.22	65.31	20	1.44	3.52	0.00
Hogchoker	42	6.39	20.03	20	0.48	2.15	0.20
Least Puffer	42	36.73	64.56	20	2.40	5.28	0.02
Lookdown	42	1.52	4.12	20	0.48	2.15	0.30
Mantis Shrimp	42	19.14	49.88	20	0.48	2.15	0.10
Pinfish	42	3.43	8.19	20	12.00	39.01	0.18
Sand Seatrout	42	277.37	233.79	20	19.68	21.00	0.00
Spanish Mackerel	42	4.68	11.79	20	1.44	3.52	0.24
Spot	42	200.86	226.04	20	28.32	53.72	0.00
Striped Mullet	42	5.51	17.92	20	0.48	2.15	0.22
Threadfin Shad	42	28.35	52.26	20	9.60	40.73	0.16
White Shrimp	42	952.12	1880.41	20	133.44	236.03	0.06

Table 20 (continued):

DATA FOR AUGUST 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Brief Squid	28	115.47	163.76	20	15.18	25.44	0.01
Atlantic Bumper	28	17.92	84.20	20	7.26	29.51	0.59
Atlantic Croaker	28	527.97	427.02	20	77.22	140.63	0.00
Atlantic Spadefish	28	6.02	8.47	20	0.66	2.95	0.01
Atlantic Stingray	28	2.10	5.23	20	1.98	4.84	0.94
Bay Anchovy	28	214.99	411.03	20	13.86	24.41	0.03
Bighead Searobin	28	3.47	6.87	20	0.66	2.95	0.09
Blue Crab	28	46.04	64.28	20	1.98	6.46	0.00
Bluntnose Jack	28	4.66	9.28	20	4.62	14.38	0.99
Brown Shrimp	28	793.98	1170.55	20	2.64	6.91	0.00
Creville Jack	28	3.01	5.12	20	0.66	2.95	0.07
Cutlassfish	28	27.13	45.64	20	1.98	6.46	0.02
Fringed Flounder	28	21.64	45.65	20	1.32	4.06	0.05
Gafftopsail Catfish	28	64.76	111.63	20	8.58	18.31	0.03
Gizzard Shad	28	33.95	104.44	20	0.66	2.95	0.16
Gulf Menhaden	28	2619.09	4525.88	20	36.30	97.46	0.01
Hardhead Catfish	28	402.92	683.59	20	19.14	23.25	0.02
Harvestfish	28	8.47	10.69	20	3.30	10.38	0.10
Inshore Lizardfish	28	3.00	8.06	20	1.32	4.06	0.40
Ladyfish	28	1.13	3.31	20	0.66	2.95	0.61
Least Puffer	28	7.12	12.28	20	0.66	2.95	0.03
Pinfish	28	8.20	16.37	20	3.30	14.76	0.29
Sand Seatrout	28	212.79	337.32	20	10.56	16.36	0.01
Spanish Mackerel	28	7.93	12.64	20	0.66	2.95	0.02
Spot	28	282.20	593.07	20	31.02	59.23	0.07
Threadfin Shad	28	25.22	33.34	20	7.26	26.56	0.05
White Shrimp	28	5726.37	9436.09	20	67.32	111.09	0.01

Table 20 (continued):

DATA FOR SEPTEMBER 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Brief Squid	36	197.66	258.16	20	10.56	18.96	0.00
Atlantic Bumper	36	12.41	35.30	20	9.24	14.27	0.70
Atlantic Croaker	36	597.34	872.52	20	113.52	170.04	0.02
Atlantic Midshipman	36	4.40	12.09	20	1.98	6.46	0.41
Atlantic Spadefish	36	7.32	9.15	20	3.30	10.38	0.14
Atlantic Stingray	36	2.08	6.57	20	1.32	4.06	0.64
Bay Anchovy	36	110.13	141.48	20	2.64	5.42	0.00
Bay Whiff	36	364.94	684.83	20	9.90	15.37	0.03
Bighead Searobin	36	0.81	2.26	20	3.96	7.54	0.02
Blue Crab	36	42.03	46.87	20	27.72	38.52	0.25
Bluntnose Jack	36	8.23	9.40	20	4.62	9.84	0.18
Brown Shrimp	36	1030.85	1181.51	20	322.08	464.12	0.01
Crevalle Jack	36	1.22	6.36	20	1.32	4.06	0.95
Cutlassfish	36	28.28	60.18	20	1.32	5.90	0.05
Fringed Flounder	36	41.54	51.79	20	19.14	30.12	0.08
Gizzard Shad	36	0.88	3.00	20	3.30	8.43	0.13
Gulf Menhaden	36	328.98	975.69	20	38.94	64.73	0.19
Hardhead Catfish	36	206.99	280.81	20	17.16	17.18	0.00
Harvestfish	36	21.79	24.17	20	7.26	15.72	0.02
Inshore Lizardfish	36	14.67	28.98	20	1.32	4.06	0.05
Least Puffer	36	7.59	13.43	20	21.78	28.17	0.01
Lesser Blue Crab	36	28.47	35.76	20	28.38	64.71	0.99
Lookdown	36	3.98	20.88	20	0.66	2.95	0.48
Mantis Shrimp	36	17.78	23.73	20	5.94	13.18	0.05
Pinfish	36	1.87	4.83	20	1.32	4.06	0.67
Roughneck Shrimp	36	16.88	29.74	20	2.64	11.81	0.05
Sand Seatrout	36	268.33	387.61	20	12.54	20.30	0.01
Spot	36	66.68	139.91	20	80.52	196.53	0.76
Striped Mullet	36	0.23	0.95	20	4.62	15.01	0.08
Threadfin Shad	36	8.19	19.80	20	32.34	58.80	0.03
White Shrimp	36	9043.05	18141.25	20	200.64	401.17	0.03

Table 20 (continued):

DATA FOR OCTOBER 1992

COMMON NAME	NUMBER OF CASES	NMFS MEAN	NMFS STD. DEV.	NUMBER OF CASES	TPWD MEAN	TPWD STD. DEV.	P-VALUE
Atlantic Brief Squid	40	277.23	450.38	26	106.62	150.31	0.07
Atlantic Bumper	40	18.37	50.05	26	18.79	80.35	0.98
Atlantic Croaker	40	211.50	195.10	26	76.66	97.86	0.00
Atlantic Spadefish	40	13.99	25.12	26	5.59	18.36	0.15
Atlantic Stingray	40	0.05	0.27	26	0.51	2.59	0.27
Bay Anchovy	40	58.80	46.23	26	15.23	31.39	0.00
Bay Whiff	40	26.26	46.05	26	7.62	16.77	0.05
Blue Crab	40	34.78	49.50	26	9.65	17.73	0.02
Bluntnose Jack	40	8.01	10.95	26	2.03	4.86	0.01
Brown Shrimp	40	773.45	1687.32	26	40.11	64.83	0.03
Cutlassfish	40	92.31	360.35	26	0.51	2.59	0.20
Fringed Flounder	40	15.87	28.05	26	35.54	68.31	0.11
Gafftopsail Catfish	40	7.18	17.13	26	0.51	2.59	0.05
Gray Snapper	40	0.09	0.54	26	0.51	2.59	0.32
Gulf Menhaden	40	548.71	1048.12	26	10.15	18.41	0.01
Gulf Toadfish	40	1.05	3.82	26	0.51	2.59	0.53
Hardhead Catfish	40	130.69	317.36	26	41.63	77.03	0.17
Harvestfish	40	42.69	49.62	26	9.14	14.35	0.00
Hogchoker	40	2.85	7.98	26	0.51	2.59	0.15
Inshore Lizardfish	40	14.56	24.21	26	4.06	8.97	0.04
Least Puffer	40	8.05	16.63	26	6.09	17.20	0.65
Lesser Blue Crab	40	20.28	36.94	26	28.94	56.62	0.45
Lookdown	40	7.89	32.84	26	4.06	13.85	0.58
Mantis Shrimp	40	28.02	90.14	26	9.65	19.60	0.31
Pinfish	40	1.99	5.22	26	1.52	7.77	0.77
Pink Shrimp	40	0.80	4.36	26	1.02	5.18	0.85
Roughback Shrimp	40	17.83	44.04	26	0.51	2.59	0.05
Sand Seatrout	40	155.68	274.31	26	20.82	30.37	0.02
Sheephead	40	0.08	0.48	26	1.02	5.18	0.26
Silver Jenny	40	0.35	1.32	26	16.25	80.19	0.21
Silver Perch	40	1.91	5.41	26	1.02	5.18	0.51
Spanish Mackerel	40	4.93	8.74	26	0.51	2.59	0.02
Spot	40	37.74	126.10	26	30.46	72.66	0.79
Star Drum	40	17.78	74.32	26	0.51	2.59	0.24
Threadfin Shad	40	36.34	82.97	26	6.09	28.49	0.08
White Shrimp	40	2255.19	3049.22	26	186.83	321.40	0.00

Table 21. Ratio of finfish and invertebrate catch to shrimp landings from Texas Parks and Wildlife Department fishery independent surveys. Data represent monthly ratios of numbers of individuals captured.

MONTH	FISH : SHRIMP	INVERT : SHRIMP
March	13.54 : 1	2.60 : 1
April	3.01 : 1	0.22 : 1
May	1.10 : 1	0.23 : 1
June	1.01 : 1	0.20 : 1
July	1.24 : 1	0.28 : 1
August	3.36 : 1	21.34 : 1
September	0.76 : 1	0.82 : 1
October	1.41 : 1	1.08 : 1

Table 22. Linear regression results for statistical (regression) comparison of NMFS and TPWD bycatch ratios. P-values less than 0.05 indicate a significant regression (correlation) among the NMFS and TPWD bycatch ratios.

Fishing Area	Finfish		Invertebrates	
	R-value	P-value	R-value	P-value
Lower Galveston Bay	0.032	0.940	0.228	0.586
Trinity Bay	0.228	0.772	0.534	0.466
Upper Galveston Bay	0.603	0.114	0.690	0.586

VI. DISCUSSION AND CONCLUSIONS

Historical Investigations

Bycatch weight averaged about 65% of the total catch per tow for the commercial bait shrimpers that were observed during Bessette's research in Galveston Bay. Bycatch species taken during shrimping activities in Galveston Bay differ by area and season. This is to be expected, since general species abundance also differs between bay areas and season, as documented by fishery independent studies of TPWD (Rice et al. 1988, Dailey et al. 1991).

Atlantic croaker, gulf menhaden and sand seatrout were among the dominant bycatch species reported by Lamkin (1984) during 1981-82 and Bessette (1985) for May-November 1984. The low occurrence in the bycatch of other special interest fish, such as southern flounder, red drum and spotted seatrout was demonstrated by both Bessette and Lamkin. Matlock (1982) reported that bycatch of southern flounder by bait and commercial shrimpers in Galveston Bay was less than that for any other Texas bay system except Upper Laguna Madre. The TPWD study reported largest flounder catch of the Galveston Bay system to be in a sample from a Trinity Bay bait dealer; largest flounder catches reported by Bessette also came from that area (Table 6).

Only one shrimper from West Bay consistently appeared to harvest more shrimp than bycatch. This fisherman's 27.2% monthly bycatch, as determined by Lamkin in 1981-82, approximates the 31.3 % determined by Zein-Eldin and Bessette for the 1984 season in West Bay. However, Lamkin identified 52 species of finfish and 4 invertebrates compared with 30 fish and 3 invertebrate species listed by Bessette for West Bay. Annual variation in species numbers within the bays have been documented by TPWD (Rice et al. 1988, Dailey et al. 1991). However, a severe freeze in late December 1983 and early January 1984 caused a massive fish kill, with resulting decreases in several species in the spring of 1984 (Rice et al. 1988). Although these species declines may be the major cause of the reduced number of species recorded by Bessette, it must be pointed out that Lamkin examined samples from three times more tows in West Bay than Bessette (62 vs. 18 by Bessette). Thus, with more intensive sampling in this area, Lamkin may have simply encountered more finfish species (including uncommon species) in his study than Bessette did in her research.

The shrimping methods of the West Bay fisherman mentioned above may be worth investigating in more detail. It would be useful to determine whether his methods would reduce bycatch in other bay areas as well. The relatively low levels of bycatch observed in samples collected from West Bay are possibly due to the fact that the West Bay fisherman utilized a "bottomless" net. The "bottomless" net has an unusually long footrope (leadline) which trails a long distance behind the headrope. A large portion of the net webbing has been removed from the underside of the trawl. These features give the net it's "bottomless" appearance except for the presence of mesh located on the underside of the cod end (at the trailing portion of the net). The net has been primarily used in estuarine areas of the middle and lower Texas coast

which have extensive oyster reefs or shell bottoms (Gary Graham, TAMU Marine Extension Service, personal communication). Removing the webbing from the bottom of the net allows shrimpers to drag across reefs or areas with hard shell substrate without damaging the trawl net. Although no specific examination of bycatch magnitude was conducted for testing the bottomless net, further investigation of this gear type has merit.

1992 Sampling

Two hundred ninety-six samples were collected in the Galveston Bay system. Of these, seven samples were not used in analyses due to problems with data collection (i.e., gear failure, mis-identification of samples, etc.). The sampling design, which followed historical trends in shrimping effort, initially called for 280 samples to be collected in the three 'fishing zones' (Trinity Bay = 101, Upper/East Bay = 117, Lower/West Bay = 62). The actual distribution of samples taken in each area deviated from the original work plan because of high freshwater inflow and low catch rates in Trinity Bay. Few, if any fishing vessels were working in Trinity Bay. This occurrence was verified by TPWD enforcement agents. The samples which were to be taken in Trinity Bay were allocated proportionately to the other two fishing areas. Thus, only 34 samples were collected in Trinity Bay. The work plan also called for collection of 10% of all samples during the December-April period. Because only a few bait shrimp vessels were fishing during this period (the commercial fishery did not open until mid-May), most of the samples for this period were collected in April (30 of 35). Distribution of samples collected in other parts of Galveston Bay system was extensive except for the Galveston ship channel (Pelican Island bridge to U.S. Coast Guard station). Numerous attempts were made to contact fishermen working the Galveston channel but none were interested in participating in this study. A significant portion of the fishery exists in this area, especially during periods of extreme environmental conditions (temperature, wind, sea state). Therefore, the characterization data presented here may not be representative of trawl bycatch in the Galveston ship channel.

Overall, bycatch within the Galveston bay system is temporally and spatially variable. During 1992 sampling efforts, bycatch weight ranged between 2% and 98% of total trawl catch (avg. =71%). Highest levels of bycatch (relative to total catch) were observed during March and April when shrimp catches were low in number and biomass. A total of 134 different species was identified from trawl subsamples (85 finfish, 49 invertebrates). Analyses of individual sites within each 'fishing zone' may provide better information on areas of high and low bycatch rates. Preliminary analyses indicate lower bycatch CPUE's from tows in Lower Galveston and West Bays, near the Galveston causeway and Offats Bayou. This parallels the low bycatch rates observed by the West Bay fisherman as reported in the Lamkin (1984) and Bessette (1985) studies. Samples taken in 1992 were collected on vessels without the 'bottomless net' which was employed by the fisherman utilized in the Lamkin (1984) and Bessette (1985) studies. Therefore, it appears that bycatch CPUE in this area is lower than that observed for other portions of Galveston Bay, although more detailed analyses are warranted.

Most of the bycatch, up to 80% by number and weight, is dominated by less than ten species. Of these, Atlantic croaker, gulf menhaden, spot, cutlassfish and sand seatrout were the most abundant. Dominance of these species in trawl bycatch may affect commercial or recreational landings. Fish of special interest such as southern flounder, red drum, black drum and spotted seatrout were captured infrequently. The presence of individual species among bycatch in Galveston Bay during specific time periods probably coincides with the timing of life history events such as spawning activity, etc. Most flounder were captured within a limited time period during the fall when they aggregated in deep channels after water temperatures decreased. Temperature decreases in the fall (Oct.-Nov.) stimulate the spawning run in which flounder migrate to offshore waters to spawn (Sabins and Truesdale 1974; Reagan and Wingo 1985; Gilbert 1986).

Overall, white shrimp CPUE's (number and biomass) were greater than for brown shrimp. The size of white shrimp were generally larger than brown shrimp. For both species, size appears to increase with distance from the Gulf. The small size of brown shrimp is one of the reasons cited by individual fishermen participating in this study for the drastic reduction of effort in Trinity Bay during 1992. Postlarvae enter the bay through 3 passes (Rollover pass, Galveston/Houston ship channel, San Luis Pass). Shrimp in the upper reaches of the bay probably endure longer residence times. We hypothesize that heavy freshwater inflow during the early portion of the shrimp season is partly responsible for the prevalence of smaller brown shrimp. Heavy rainfall during March-June resulted from unusual weather patterns because of the "El Niño" phenomenon in the Pacific Ocean. Low salinity conditions in Galveston Bay may limit the availability of optimal habitat for shrimp. Other effects of high freshwater inflow are not entirely quantified, but freshwater conditions may negatively impact food sources utilized by shrimp. Shrimp feed on detritus and benthic organisms and high freshwater inflow may alter the abundance of shrimp prey items. Low salinity conditions may also modify habitat utilization for some finfish, thus affecting predation rates and mortality of shrimp. Nevertheless, preliminary analyses indicate positive correlation of increased white shrimp abundance in TPWD survey during "El Niño" years (Anne Walton, TPWD, Resource Protection Division, personal communication). The long term impacts of high freshwater inflow are not known. Low salinity conditions in Galveston Bay also occurred during the spring of 1990 and 1991; heavy precipitation in the Galveston Bay watershed led to freshwater conditions over a large portion of the bay, especially in upper Galveston Bay and Trinity Bay.

Spatial differences in size were also observed for finfish species. Generally, larger individuals of cutlassfish, spotted seatrout, red drum were observed in upper Galveston and East bays. However, the low occurrence of spotted seatrout and red drum in all samples does not provided conclusive evidence of spatial differences in length of these species. Samples from lower Galveston Bay indicate larger individuals of gulf menhaden, sand seatrout, southern flounder and black drum. Spatial differences in size of individual species may also be related to optimal habitat and natural geographic distributions within the bay. Salinity is a major factor in determining the distribution of many estuarine finfish in the same manner as it affects penaeid shrimp distribution in Galveston Bay. Juvenile forms of gulf menhaden, spot and Atlantic croaker are abundant in polyhaline and euryhaline areas (Monaco et al. 1989). Adult sand seatrout and Atlantic croaker are also

abundant in these areas. All life forms (eggs, larvae, juveniles, adults) of hardhead catfish, are also abundant in polyhaline and euryhaline areas of Galveston Bay (Monaco et al. 1989). Generally, fewer species are found in freshwater portions of the bay (Monaco et al. 1989). Nevertheless, large numbers of individual freshwater species were (blue catfish, shad, Ohio shrimp, etc.) were captured in trawls sampled from Trinity Bay during April-May, 1992. Spotted seatrout and southern flounder are not usually found in freshwater areas (Monaco et al. 1989). However, 1992 data show that both of these species were captured in tows from Trinity Bay (1992) when salinity was measured at 0 ppt.

The scope of this study did not include a thorough examination of bycatch mortality. Magnitude of bycatch reported here represents only fish that were captured during trawling operations, therefore, mortality levels are impossible to determine from the data available. Since bycatch levels during the 1992 season were estimated at 3.7 million kg of finfish and 548,000 kg of invertebrates, mortality rates are important in assessing impacts on population structures of individual bycatch species. It is also important to consider that most fishermen (18 out of 19) which participated in new sampling efforts utilized culling tanks on their vessels. The catch is released from the net into the culling tanks. Bycatch is removed and returned the water; shrimp are retained in a separate holding tank or in partitioned section of the culling tank. Compared with catch which is dumped on deck prior to sorting, the use of a culling tank may significantly increase survival of bycatch organisms.

The proportion of bycatch returned to the water in good condition was not specifically examined in this study or in historical studies previously reviewed in this document. Injured or dead bycatch items may have ecological importance in the bay system as part of the food web and nutrient recycling. No attempt was made in the studies reviewed here to do more than weigh the bycatch and consider its species composition.

Debris items were not categorized by individual type (i.e., plastic, paper, etc.) but they were among the top 15 items (based on weight) captured in shrimp trawls. No detailed analysis could be conducted for the large species captured (sharks, stingrays, alligator gar, etc.) although their presence was recorded. These species remain a part of overall bycatch in shrimp trawls and must be considered as such.

Comparison With TPWD Fishery Independent Survey

Few conclusions can be drawn from the statistical comparisons between the TPWD fishery-independent and the NMFS fishery-dependent data. The length-frequency (Kolmogorov-Smirnov) analyses showed significant differences in all monthly length distributions for 4 of the 14 species (brown shrimp, roughback shrimp, spot, and white shrimp). For brown and white shrimp, the directed species, differences in size composition among the two data sets were detected for each month. Tests for three other species (Atlantic croaker, Atlantic brief squid, and hardhead catfish) yielded significant differences in all but one month. Only 2 species (pink shrimp and spotted seatrout) produced no significant differences for any month. However, these were two rare species in terms of catch abundance. Length distributions of the last five other

species (bay anchovy, blue crab, cutlassfish, gulf menhaden, and sand seatrout) were significantly different in some months and not in other months. Consequently, there did not appear to be any discernible trends from analyses of species-specific length distributions.

Similarly, statistical analyses of CPUE values (Student t-test), of most species found during two or more months were significantly different some months and not for other months. Mean CPUE values for four species were significantly different during all months, while CPUE values for 15 species were not significantly different during all months. Generally, significant differences in CPUE and size composition were not observed for some species but only during specific months. There appeared to be no discernible trends produced from the analysis of the species-specific monthly mean CPUE values.

The results of the regression analysis indicate that bycatch ratios from TPWD survey trawls and NMFS trawl samples (collected on commercial shrimp vessels) are not comparable. Significant differences in bycatch ratios were observed for all three fishing zones ($\alpha = 0.05$, $p > 0.1$; Table 22). Consequently, based on the information collected by NMFS in 1992 (and subsequent analyses presented here) it appears that fishery independent collections conducted by TPWD are not sufficient for development of an index which will estimate the magnitude and size composition of organisms taken during fishery dependent activities (based on 1992 samples).

General Discussion and Conclusions

The issue of bycatch in fisheries is rapidly becoming one of the most important problems facing the fishing industry and fishery managers alike. Tillman (1993) reports three primary reasons for the current concerns about bycatch: 1) user conflicts, 2) legislative mandates and 3) public ethics and attitudes toward waste. Fishery managers are faced with the responsibility of protecting living marine resources and ensuring the viability of future fishery stocks. Regardless of the actual impacts, bycatch has become a resource management problem because it is perceived as such by the public (Murray et al. 1992). Increased environmental awareness worldwide has focused attention on impacts of fishing techniques regardless of whether damages incurred are actual or perceived. The bycatch issue came to the forefront in the U.S. during the middle and late 1980's when shrimp trawling was seen as one of the causes for a decline in red snapper stocks and capture of threatened or endangered sea turtles in the Gulf of Mexico (Henwood and Stuntz 1987, Goodyear and Phares 1990, Goodyear 1991). Shrimp landings comprise the most important fishery in the U.S. in terms of value (Thompson 1983, 1984, 1985, 1986, 1987; O'Bannon 1988, Holliday and O'Bannon 1992); however, the economic importance of the shrimp fishery will not be enough to mediate the concerns of fishery managers, environmentalists and other interests with respect to bycatch. From the perspective of the fisherman, the primary goal is to maximize catch of shrimp and minimize bycatch. Bycatch adds to sorting and processing time. Consequently, the quality of shrimp produced suffers from prolonged exposure to high temperatures (Nelson 1993). Elimination or reduction of bycatch in trawls (and other gear types) would reduce sorting time and discards while improving the quality of the product.

Galveston Bay maintains the highest abundance of fish populations relative to all other Texas estuaries (Monaco et al. 1989). Abundance of fish in Galveston Bay is estimated at more than 6,000 fish per hectare (annual mean; Monaco et al. 1989). The magnitude and composition of bycatch in shrimp trawls is extremely variable with respect to time and area. This variability was evident in data recorded historically (Lamkin 1984, Bessette 1985) and also in recent samples taken from new sampling efforts. Since trawl nets usually do not select for individual species, temporal and spatial variability in bycatch may be a reflection of community structure within the bay system. In 1992, species diversity was highest during June-July and in the Upper and Lower reaches of Galveston Bay. The variability in bycatch (and abundance of individual species) is probably regulated by many complex, interacting factors. Abundance of estuarine species during a specific year are not only be influenced by present environmental conditions; conditions in previous years which impacted the magnitude of parent stocks or affected reproductive success may also be reflected in abundance of individuals during successive years. TPWD has examined trends in populations of living marine resources (based on trawl surveys) as a means of analyzing long term changes in individual stocks. As temporal changes in population structures are identified, further analyses may provide insight or clues to cause-effect relationships. The long term trends indicate that only blue crab and white shrimp stocks in Galveston Bay were in chronic decline during 1982-1990 (Osborn et al. 1992). However, white shrimp stocks appear to have rebounded in 1991 and 1992 based on TPWD survey data (Anne Walton, TPWD Resource Protection Division, Austin, TX; personal communication).

Generally, bycatch is dominated by several species. Atlantic croaker, gulf menhaden, sand seatrout, spot, bay anchovy, and hardhead catfish account for the majority of bycatch in terms of numbers and biomass. Although slight differences in ranking of individual species were observed by both Lamkin (1984) and Bessette (1985), the same species made up the bulk of bycatch reported historically. Anecdotal reports from commercial fishermen in Galveston Bay indicate that these species generally dominate bycatch composition each year. Atlantic croaker, sand seatrout and spot are listed among the top recreational species landed by anglers fishing in Galveston Bay (Campbell et al. 1991). Menhaden accounted for the largest quantity of commercial fishery landings in the United States during 1982-87 (Thompson 1983, 1984, 1985, 1986, 1987; O'Bannon 1988). The menhaden fishery was second in the U.S. in terms of commercial quantities landed during 1991; gulf menhaden accounted for 60% of all menhaden landings (~550 million kg; Holliday and O'Bannon 1992). Monaco et al. (1989) report that gulf menhaden is one of the most abundant species in Galveston Bay (> 1000/hectare). Atlantic croaker and spot in Galveston Bay are classified as moderately abundant (40-800/hectare; Monaco et al. 1989). Thus, abundance of these species in bycatch from shrimp trawls may be important when considering impacts on recreational or commercial landings. However, it appears that trawling operations in Galveston Bay are not significantly impacting individual populations of these species. Based on TPWD long term trend analyses, the abundance of Atlantic croaker, sand seatrout and bay anchovy captured in trawls increased during 1983-1990 (Osborn et al. 1992). Despite a slight decrease during 1987-1990, trawl catch of gulf menhaden increased between 1983-1990 (Osborn et al. 1992). The fact that these species are among the dominant catches of both recreational and commercial fisheries attests to their abundance. Whitaker et al.

(1989) concluded that commercial shrimp trawling in South Carolina's sounds and bays does not significantly impact estuarine finfish species. Additional monitoring is required because it is difficult to determine the overall impacts based on the data presented here.

Cutlassfish and hardhead catfish were dominant bycatch species observed in 1992 samples. However, cutlassfish was not among the most abundant species in tows taken by bait shrimpers in previous studies (Lamkin 1984, Bessette 1985). Cutlassfish CPUE in TPWD surveys was extremely low in comparison with 1992 data (all months). Blue crab was a major species listed by Lamkin (1984) but was not among the dominant species listed by Bessette (1985) or in the 1992 NMFS study. Blue crab CPUE's measured in TPWD trawl surveys during 1992 were generally lower than those observed during new sampling efforts.

Special interest fish, such as southern flounder, red drum and spotted seatrout were captured infrequently in samples taken by both Bessette (1985) and Lamkin (1984). Similar results were observed during the 1992 sampling efforts conducted by NMFS as well as the fishery independent surveys of TPWD. Red drum, spotted seatrout, black drum and southern flounder are common (< 40/hectare) but not abundant in Galveston Bay (Monaco et al. 1989). Natural populations of red drum, spotted seatrout and black drum have been augmented by TPWD through the release of hatchery-reared individuals. However, red drum and spotted seatrout are among several estuarine-dependent species whose stocks were believed to be in decline (Osborn et al., 1992).

More species were captured during 1992 (>130) in comparison other studies (Lamkin 1984, 56 species; Bessette 1985, 74 species; 1992 TPWD survey, 79 species). Differences in sampling effort and intensity are probably responsible for the variance among these data. Overall, bycatch ranged between 27% (Lamkin 1984) and 71% (1992 data) of total catch. Finfish : shrimp biomass ratios were equally variable among all studies. Bessette (1985) and Zein-Eldin and Bessette (in prep.) report an overall ratio of 4.1 kg of bycatch per kg of shrimp landed. The overall ratio during 1992 was approximately 3 to 1 (2.64 kg of fish and 0.39 kg of invertebrates captured per kg of shrimp). Monthly ratios were highest during March-April when abundance of shrimp in Galveston Bay is low. However, only live-bait fishing is permitted during these months and only a small portion of the total effort from Galveston Bay is exerted during this period. Numerical ratios for TPWD survey data (biomass data not available) were generally higher than those observed in the NMFS study; however, monthly trends were similar. The higher ratios in the trawl survey may be due to less samples collected and smaller sample sizes; the TPWD surveys are limited to 10 minute tows.

Survival of discards was not specifically measured during 1992 sampling efforts. Mortality of bycatch is dependent on numerous factors (tow duration, total catch size, sorting/processing catch, etc.). Air and water temperature and the presence of predators may affect survival rates of individuals returned to the bay waters. Temperature and salinity in the bay (and in culling tanks) affects oxygen saturation of water and biophysical demands of estuarine species. As temperature increases throughout the day, water temperatures in culling tanks may exceed optimal levels. This, along with the high density of animals released from the net, increases stress on

bycatch species and can lead to higher mortality. Individuals returned to the water soon after being caught are generally in good condition. However, field observations indicate that organisms which endured prolonged periods in the trawl net or culling tanks generally exhibited higher mortality rates. Generally, tow times among commercial bay trawlers are longer than for bait shrimpers. Commercial shrimping in the bay is limited to 2 seasons (May-July, August-December) and no trawling is permitted after 2:00 pm during the spring open season (May-July). Bait shrimping occurs year-round; the magnitude of bait shrimping effort (seasonally) depends on market demand, shrimp catch and weather conditions. Bait shrimpers must maintain at least 50% of total shrimp catch in a live condition. A review of Texas shrimp fishery regulations is provided in Appendix 2.

Several studies in other coastal areas have provided evidence on the importance of environmental factors in regulating survival rates. Mortality of bycatch from inshore trawl fisheries in Florida was variable. In St. John's River, mortality of bycatch from 30 minutes tows was low in February and high in July (Snyder et al. 1993). The differences were probably due to the magnitude of bycatch caught, handling techniques and water temperature (David Snyder, Continental Shelf Associates, Inc., Jupiter, FL; personal communication). In Pine Island Sound, Florida, very low mortality occurred among bycatch from 8 minute tows in both summer and winter trials (Snyder et al. 1993). The extremely short tow time is probably a factor because the total catch should be smaller; bycatch organisms spend less time in the net, sorting time is proportionately decreased and stress on individuals is minimized. In Australian coastal waters, observations indicate that mortality is high (Wassenberg and Hill 1989, Kennelly 1993). Mortality of some species were attributed to drowning, being crushed in the net or stung by venomous bycatch (Kennelly 1993).

Some species are less hardy and more vulnerable to the stresses of trawling and processing (sorting). It is not uncommon for some species to die up to several weeks after any form of handling (Kennelly 1993). Trawling and sorting may only cause superficial damage but the possibility of infection may remain long after organisms are returned to the water. In Galveston Bay, field observations provide an indication that squid, anchovies and spotted seatrout may be less tolerant to trawling than crabs, croaker, drum and many other species. Low mortality rates may be a reason for apparently low impacts of bycatch on Atlantic croaker populations. Differences in survival have been observed even within a single genus; Wassenberg and Hill (1990) reported >60% survival among one species of flounder while <20% of another species in the same genus survived (Australian coastal waters).

Shorter tow times among bait shrimpers may reduce mortality rates. Rayburn (1993) observed that due to restrictions already imposed on the Texas bait shrimp fishery, much of the bycatch is returned to the estuary in a live condition and, "while it may not survive due to predation by seabirds or other scavengers aggregating around the vessel, the overall impact to the stock should be minimal." Other restrictions on the fishery may have reduced total bycatch in recent years by decreasing overall fishing effort (Rayburn 1993).

In a worst case scenario with 100% mortality, ~3.7 million kg of finfish (estimated; see Table 17) would be killed by shrimp trawling. By comparison, bycatch in the

VII. INDUSTRY ADVISORY PANEL

Selection of the Industry Advisory Panel

Prior to implementation of sampling, an industry advisory panel composed of three representatives from the Galveston Bay shrimping community (approved by the Management Committee of the GBNEP) was convened to act as communication between fishermen and the investigators. Sampling design and methodologies were conveyed to the fishing community through this panel as well as by the principal investigators. Concerns or requests by the fishing community were considered without bias. The advisory panel also served to provide input regarding changes to sampling protocols and editorial review of quarterly and final reports. Panel members included Mr. Tom Hults, proprietor of a shrimp and seafood processing business; Mr. Terry Snider, owner and operator of a live-bait camp located on Galveston Bay and Mr. C. L. Standley, a commercial shrimp fisherman in Galveston Bay. All panel members had previously served on, or were active members of, other advisory panels which addressed fishery concerns in the Galveston Bay system.

Comments of the Industry Advisory Panel

1. The decreased levels of bycatch observed in samples taken from the West Bay fisherman with the "bottomless" net is not primarily due to utilization of a different gear type. The fishing techniques and area fished by that individual fisherman also contribute to low levels or reported bycatch³.
2. The 1992 study was completed in a manner which appeared to be as fair as possible (given resource limitations) to the shrimping industry while maintaining scientific integrity. However, use of additional vessels may have enhanced overall results with respect to characterizing bycatch composition and abundance.
3. Bycatch appeared to be higher than normal this year (higher percentage of the total catch and in greater numbers), primarily due to the large amount of rainfall in the spring.
4. Cutlassfish (*Trichiurus lepturus*) and hardhead catfish (*Arius felis*) were caught in greater numbers this year than in past years.
5. The high levels of rainfall and freshwater input into Galveston Bay during the last four years may have a cause-effect action on the populations (and ultimately trawl catch) some finfish, especially some species of catfish.
6. Sampling should continue for no less than 5 years to provide information on trends in abundance, distribution and composition of bycatch species.

³ Preliminary analysis of data from the 1992 study indicate that comparable levels of bycatch from tows in that portion of West Bay are observed.

would decrease shrimp stocks by 25%. In the model, the effect of discards is through re-assimilation of bycatch and/or nutrients into the shrimp population (Sheridan et al. 1981). In Galveston Bay, predation by estuarine dependent finfish is a primary cause of mortality of juvenile shrimp in nursery areas (Minello et al. 1989). The main predators of juvenile penaeid shrimp in nursery areas include southern flounder, spotted seatrout, red drum, gulf killifish, pinfish and, to a lesser extent, spot (Minello et al. 1989). Removal of predators (or competitors) may benefit shrimp populations and ultimately, fishery production. Spot are regularly captured in shrimp trawls while southern flounder, spotted seatrout, red drum and pinfish occur infrequently among bycatch species. Divita et al. (1983) reported that penaeid shrimp emigrating from Texas estuaries (into the Gulf of Mexico) are a major prey item for silver seatrout, sand seatrout, southern kingfish, rock sea bass, dwarf sand perch, southern hake and lane snapper. Most of these species were captured in 1992 trawls sampled; sand seatrout was among the dominant bycatch species. De Diego (1984) reported that only 5 of 17 species (Atlantic sharpnose shark, Atlantic croaker, ladyfish, spotted seatrout and bighead searobin) captured with gill nets around the Galveston ship channel contained shrimp in their stomachs. Data collected by De Diego (1984) indicated low predation rates on shrimp; only 2.4 % (11 fish) of all fish collected had eaten penaeid shrimp; however, the small sample size may have confounded the results.

Rayburn (1993) observed that, "it is incumbent on the state to insure that the parameters of the public trust are adequately considered to insure that the bycatch does not negatively impact other resource users, that ecosystem balance is not being substantially undermined, that endangered or threatened species are being protected and that adequate rent is being extracted from the harvested resources to cover the costs of management and negative impacts." The use of time/area management is being considered as a possible method for dealing with the bycatch problem. This involves the closure or restriction of fishing in specific 'problem' areas during periods when bycatch is a problem (i.e., when juvenile finfish are resident in a specific fishing area). In Australia, scientists would recommend geographic and temporal closures to minimize impacts on bycatch species (Kennelly et al. 1993). There has already been precedent established for time/area management in North American fisheries. Provisions in the Gulf of Alaska Groundfish Fishery Management Plan (approved in 1985) allow for closure of the groundfish fishery when an annual quota of halibut bycatch has been attained (Blackburn and Davis 1992). However, Whitaker et al. (1989) reported that the relative abundance of fish in areas closed to commercial fishing in South Carolina were no different from those areas where trawling effort and bycatch are high.

Gear modifications such as fish excluder and bycatch reduction devices show some promise towards reduction of trawl bycatch. Utilization of the 'bottomless net' by a single fisherman in West Bay (Lamkin 1984, Bessette 1985) resulted in lower bycatch. However, more analyses are required to determine if lower bycatch was related to other factors; preliminary analyses from 1992 data indicate below average bycatch rates in the same fishing area. In fact, some fishermen have voluntarily utilized some types of bycatch reduction devices for many years. Individual fishermen utilize the gear and techniques with which they are most familiar and which best apply to specific conditions they encounter. The most common is some form of a 'cannonball shooter' which is used during times of high abundance for

'cannonball' or cabbage head jellyfish (*Stomolophus* spp.). 'Fish eyes' are used for periods or areas with high finfish abundance. Use of TED's (Turtle Excluder Devices) in inshore waters was mandated by NMFS at the end of 1992. Certain exemptions apply for some vessels which limit gear size and tow times; however, exemptions only appear to be applicable through 1994. Utilization of TED's should help in reducing overall bycatch. There are many different designs for TED's and bycatch reduction devices which are being used or tested in the Gulf of Mexico (review Fowle and Bierce 1992, Jones 1993). The number of TED's certified for use in offshore waters has increased in recent years because no individual gear modification is applicable or useful for general use. The applicability of excluder/reduction devices in bays and estuaries has not been thoroughly examined; bay trawlers utilize smaller vessels with less power than offshore boats. Bay fisherman are limited to one net (smaller than those used offshore) and different restrictions for net size apply during the spring and fall commercial seasons (see Appendix 2). The variety of complex habitats and trawlable bottom in estuarine systems will further preclude the use of any single gear modification that will achieve satisfactory bycatch reduction while preventing loss of production. Extensive testing of gear modifications would be required for effective implementation of bycatch reduction devices in estuaries.

We recommend additional monitoring of bycatch to examine long term trends in magnitude and composition of bycatch (and associated effects) prior to implementation of specific management schemes. The highly variable nature of the data collected during new sampling efforts require additional sampling if trends and spatial/temporal variations in bycatch are to be addressed. The fishing industry is unwilling to accept regulatory mandates based on inadequate data and limited knowledge of the impacts of bycatch on the ecosystem (Nelson 1993). Future studies in Galveston Bay also need to be specifically designed to address ecological issues associated with shrimp trawl bycatch. Differences in fishing techniques and gear types used by commercial vs. live bait shrimpers may affect magnitude of bycatch as well as survival of discards. Effect of tow depth and speed may be important in explaining differences in species composition or capture of various life stages (size classes). Water clarity, salinity, temperature, tidal patterns and physiological/behavioral characteristics of finfish and invertebrates may also explain differences in abundance and distribution of individual species. Salinity appears to be especially important; the bycatch species observed during 1992 included a number of freshwater species throughout Trinity Bay and the upper reaches of Galveston Bay. The presence of several marine species in the lower bay area provides evidence of the influences of tidal effects. Additional analyses of the present database may determine the importance of these and other factors on bycatch magnitude, composition and fate. Investigations which are designed to answer specific questions regarding effects of bycatch on ecological niches, community structures, predator-prey interactions and nutrient cycling are critical to understanding the overall impacts of shrimp trawling operations. There is evidence that removal of individual bycatch species during trawling can have ecological implications (review Freeberg 1992). Impacts on forage species, although difficult to quantify, should have been realized long ago, given the long term existence of commercial trawling. Nevertheless, we recommend that future investigations also focus on bycatch mortality and its impact on community structure, predator-prey interactions, nutrient dynamics, etc. In future years, the impact of TED utilization toward mitigating bycatch will also

need to be quantified. The use of more efficient TED's or other bycatch reduction devices in the future may negate any adverse impacts of shrimp trawling with respect to bycatch. All of this information will be a prerequisite to effective management measures. Additionally, economic impacts of management measures on the fishing industry are being more closely scrutinized, especially during recent times of recession and a stagnant economy. Implementation of management measures to reduce/eliminate bycatch may have economic impacts on the shrimp fishery itself as well as other businesses which serve the fishery (fuel, supplies, distributors, etc.).

Finally, the success of the 1992 characterization was largely due to the participation of individual fishermen. Without their assistance, and that of the industry advisory panel, the data collected would be lacking in quantity and quality. Future efforts to characterize, address or resolve issues regarding bycatch should include input from the fishing industry if productive investigations and viable solutions are expected.

VII. INDUSTRY ADVISORY PANEL

Selection of the Industry Advisory Panel

Prior to implementation of sampling, an industry advisory panel composed of three representatives from the Galveston Bay shrimping community (approved by the Management Committee of the GBNEP) was convened to act as communication between fishermen and the investigators. Sampling design and methodologies were conveyed to the fishing community through this panel as well as by the principal investigators. Concerns or requests by the fishing community were considered without bias. The advisory panel also served to provide input regarding changes to sampling protocols and editorial review of quarterly and final reports. Panel members included Mr. Tom Hults, proprietor of a shrimp and seafood processing business; Mr. Terry Snider, owner and operator of a live-bait camp located on Galveston Bay and Mr. C. L. Standley, a commercial shrimp fisherman in Galveston Bay. All panel members had previously served on, or were active members of, other advisory panels which addressed fishery concerns in the Galveston Bay system.

Comments of the Industry Advisory Panel

1. The decreased levels of bycatch observed in samples taken from the West Bay fisherman with the "bottomless" net is not primarily due to utilization of a different gear type. The fishing techniques and area fished by that individual fisherman also contribute to low levels or reported bycatch³.
2. The 1992 study was completed in a manner which appeared to be as fair as possible (given resource limitations) to the shrimping industry while maintaining scientific integrity. However, use of additional vessels may have enhanced overall results with respect to characterizing bycatch composition and abundance.
3. Bycatch appeared to be higher than normal this year (higher percentage of the total catch and in greater numbers), primarily due to the large amount of rainfall in the spring.
4. Cutlassfish (*Trichiurus lepturus*) and hardhead catfish (*Arius felis*) were caught in greater numbers this year than in past years.
5. The high levels of rainfall and freshwater input into Galveston Bay during the last four years may have a cause-effect action on the populations (and ultimately trawl catch) some finfish, especially some species of catfish.
6. Sampling should continue for no less than 5 years to provide information on trends in abundance, distribution and composition of bycatch species.

³ Preliminary analysis of data from the 1992 study indicate that comparable levels of bycatch from tows in that portion of West Bay are observed.

7. Bycatch mortality is part of the ecological system and natural populations may cycle to account for this.
8. Predator-prey interactions and ecological niches of bycatch species are poorly defined and merit further investigation.
9. Stock assessment of individual bycatch species is unknown. Comprehensive examination of the size of total populations is necessary to determine what percentage of finfish (or invertebrates) are being captured or impacted (1%, 50%, 90%, etc.).
10. Does trawling help to minimize or regulate competitors/predators thus possibly providing some benefit to commercial or recreational fisheries? Further investigation is needed to determine the impact of trawling (and bycatch reduction) on each species as well as commercial and recreational fisheries.

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Appendix 1. Listing of common and scientific names of fishes and invertebrates captured during historical and 1992 bycatch studies. Common and scientific names follow standards set by the American Fisheries Society (Turgeon et al. 1988, Williams et al. 1988, Robins et al. 1991).

Listed alphabetically by scientific name:

Scientific Name	Common Name
<i>Acetes</i> spp.	Sergestid Shrimp
<i>Achirus lineatus</i>	Lined Sole
<i>Alpheus</i> spp.	Unidentified Snapping Shrimp
<i>Anadara ovalis</i>	Blood Ark
<i>Anchoa hepsetus</i>	Striped Anchovy
<i>Anchoa mitchilli</i>	Bay Anchovy
<i>Ancylopsetta quadrocellata</i>	Ocellated Flounder
<i>Archosargus probatocephalus</i>	Sheephead
<i>Arius felis</i>	Hardhead Catfish
<i>Astroscopus y-graecum</i>	Southern Stargazer
<i>Bagre marinus</i>	Gafftopsail Catfish
<i>Bairdiella chrysoura</i>	Silver Perch
<i>Balanus</i> spp.	Common Barnacle
<i>Beroe</i> spp.	Comb Jellyfish
<i>Brachidontes recurvus</i>	Bent Mussel
<i>Brevoortia gunteri</i>	Finescale Menhaden
<i>Brevoortia patronus</i>	Gulf Menhaden
<i>Brotula barbata</i>	Bearded Brotula
<i>Busycon perversum</i>	Perverse Whelk
<i>Callinectes sapidus</i>	Blue Crab
<i>Callinectes similis</i>	Lesser Blue Crab
<i>Caranx hippos</i>	Creville Jack
<i>Caranx latus</i>	Horse-Eye Jack
<i>Carcharhinus limbatus</i>	Blacktip Shark
<i>Centropomus philadelphicus</i>	Rock Sea Bass
<i>Chaetodipterus faber</i>	Atlantic Spadefish
<i>Chaetodon ocellatus</i>	Spotfin Butterflyfish
<i>Chasmodes bosquianus</i>	Striped Blenny
<i>Chilomycterus schoepfi</i>	Striped Burrfish
<i>Chloroscombrus chrysurus</i>	Atlantic Bumper
<i>Chrysaora quinquecirrha</i>	Sea Nettle
<i>Citharichthys spilopterus</i>	Bay Whiff
<i>Clibanarius vittatus</i>	Thinstripe Hermit Crab
<i>Crassostrea virginica</i>	American Oyster
<i>Cynoscion arenarius</i>	Sand Seatrout
<i>Cynoscion nebulosus</i>	Spotted Seatrout
<i>Cynoscion nothus</i>	Silver Seatrout
<i>Cynoscion</i> spp.	Unidentified Seatrout
<i>Cyprinus carpio</i>	Common Carp
<i>Cyrtopleura costata</i>	Angelwing
<i>Dasyatis sabina</i>	Atlantic Stingray
Debris	Debris
<i>Dorosoma cepedianum</i>	Gizzard Shad
<i>Dorosoma petenense</i>	Threadfin Shad
<i>Elops saurus</i>	Ladyfish
<i>Etropus crossotus</i>	Fringed Flounder
<i>Eucinostomus argenteus</i>	Spotfin Mojarra
<i>Eucinostomus gula</i>	Silver Jenny
<i>Eucinostomus harengulus</i>	Tidewater Mojarra
<i>Eucinostomus melanopterus</i>	Flagfin Mojarra
<i>Eucinostomus</i> spp.	Unidentified Mojarra
<i>Eurypanopeus depressus</i>	Flatback Mud Crab
<i>Gobiosoma strumosus</i>	Skilletfish
<i>Gobioides broussoneti</i>	Violet Goby
<i>Gobionellus boleosoma</i>	Darter Goby
<i>Gobionellus oceanicus</i>	Highfin Goby
<i>Harengula jaguana</i>	Scaled Sardine
<i>Hemicaranx amblyrhynchus</i>	Bluntnose Jack
<i>Hepatus epheliticus</i>	Calico Box Crab
<i>Hexapanopeus angustifrons</i>	Smooth Mud Crab
<i>Hypsoblennius ionthas</i>	Freckled Blenny
<i>Ictalurus furcatus</i>	Blue Catfish

Listed alphabetically by common name:

Common Name	Scientific Name
Alligator Gar	<i>Lepisosteus spatula</i>
American Oyster	<i>Crassostrea virginica</i>
Angelwing	<i>Cyrtopleura costata</i>
Atlantic Brief Squid	<i>Lolliguncula brevis</i>
Atlantic Bumper	<i>Chloroscombrus chrysurus</i>
Atlantic Croaker	<i>Micropogonias undulatus</i>
Atlantic Midshipman	<i>Porichthys plectrodon</i>
Atlantic Mud Crab	<i>Panopeus herbstii</i>
Atlantic Rangia	<i>Rangia cuneata</i>
Atlantic Sharpnose Shark	<i>Rhizoprionodon terraenovae</i>
Atlantic Spadefish	<i>Chaetodipterus faber</i>
Atlantic Stingray	<i>Dasyatis sabina</i>
Atlantic Thread Herring	<i>Ophisthonema oglinum</i>
Atlantic Threadfin	<i>Polydactylus octonemus</i>
Banded Drum	<i>Larimus fasciatus</i>
Bay Anchovy	<i>Anchoa mitchilli</i>
Bay Whiff	<i>Citharichthys spilopterus</i>
Bearded Brotula	<i>Brotula barbata</i>
Bent Mussel	<i>Brachidontes recurvus</i>
Bighead Searobin	<i>Prionotus tribulus</i>
Black Drum	<i>Pogonias cromis</i>
Blackcheek Tonguefish	<i>Symphurus plagiusa</i>
Blacktip Shark	<i>Carcharhinus limbatus</i>
Blackwing Searobin	<i>Prionotus rubio</i>
Blood Ark	<i>Anadara ovalis</i>
Blotched Swimming Crab	<i>Portunus spinimanus</i>
Blue Catfish	<i>Ictalurus furcatus</i>
Blue Crab	<i>Callinectes sapidus</i>
Bluefish	<i>Pomatomus saltatrix</i>
Bluespotted Searobin	<i>Prionotus roseus</i>
Bluntnose Jack	<i>Hemicaranx amblyrhynchus</i>
Brackish Grass Shrimp	<i>Palaemonetes intermedius</i>
Brown Rangia	<i>Rangia flexuosa</i>
Brown Shrimp	<i>Penaeus aztecus</i>
Butterfish	<i>Peprilus</i> spp.
Calico Box Crab	<i>Hepatus epheliticus</i>
Cannonball Jellyfish	<i>Stomolophus meleagris</i>
Chain Pipefish	<i>Syngnathus louisianae</i>
Clearnose Skate	<i>Raja eglanteria</i>
Clown Goby	<i>Microgobius gulosus</i>
Comb Jellyfish	<i>Beroe</i> spp.
Common Barnacle	<i>Balanus</i> spp.
Common Carp	<i>Cyprinus carpio</i>
Cownose Ray	<i>Rhinoptera bonasus</i>
Creville Jack	<i>Caranx hippos</i>
Cutlassfish	<i>Trichiurus lepturus</i>
Daggerblade Grass Shrimp	<i>Palaemonetes pugio</i>
Darter Goby	<i>Gobionellus boleosoma</i>
Debris	Debris
Dimpled Hermit Crab	<i>Pagurus impressus</i>
Dwarf Herring	<i>Jenkinsia lamprotaenia</i>
Finescale Menhaden	<i>Brevoortia gunteri</i>
Flagfin Mojarra	<i>Eucinostomus melanopterus</i>
Flatback Mud Crab	<i>Eurypanopeus depressus</i>
Flatclaw Hermit Crab	<i>Pagurus pollicaris</i>
Florida Pompano	<i>Trachinotus carolinus</i>
Florida Rocksnail	<i>Thais haemostoma</i>
Florida Stone Crab	<i>Menippe mercenaria</i>
Freckled Blenny	<i>Hypsoblennius ionthas</i>
Fringed Flounder	<i>Etropus crossotus</i>
Gafftopsail Catfish	<i>Bagre marinus</i>
Gizzard Shad	<i>Dorosoma cepedianum</i>

Appendix 1 (continued):

Listed alphabetically by scientific name:

Scientific Name	Common Name
<i>Ischadium recurvum</i>	Hooked Mussel
<i>Jenkinsia lamprotaenia</i>	Dwarf Herring
<i>Lagodon rhomboides</i>	Pinfish
<i>Larimus fasciatus</i>	Banded Drum
<i>Latreutes parvulus</i>	Sargassum Shrimp
<i>Leiostomus xanthurus</i>	Spot
<i>Lepisosteus oculatus</i>	Spotted Gar
<i>Lepisosteus spatula</i>	Alligator Gar
<i>Libinia dubia</i>	Longnose Spider Crab
<i>Libinia emarginata</i>	Portly Spider Crab
<i>Lobotes surinamensis</i>	Tripletail
<i>Lolliguncula brevis</i>	Atlantic Brief Squid
<i>Lutjanus griseus</i>	Gray Snapper
<i>Lutjanus synagris</i>	Lane Snapper
<i>Lysmata wurdemanni</i>	Peppermint Shrimp
<i>Macrobrachium ohione</i>	Ohio Shrimp
<i>Membras martinica</i>	Rough Silverside
<i>Menidia beryllina</i>	Inland Silverside
<i>Menippe mercenaria</i>	Florida Stone Crab
<i>Menticirrhus americanus</i>	Southern Kingfish
<i>Menticirrhus littoralis</i>	Gulf Kingfish
<i>Microgobius gulosus</i>	Clown Goby
<i>Micropogonias undulatus</i>	Atlantic Croaker
<i>Monacanthus hispidus</i>	Planehead Filefish
<i>Monacanthus setifer</i>	Pygmy Filefish
<i>Mugil cephalus</i>	Striped Mullet
<i>Mugil curema</i>	White Mullet
<i>Neopanopeus texanus</i>	Mud Crab
<i>Neverita duplicata</i>	Shark Eye Mollusk
<i>Oligoplites saurus</i>	Leatherjack
<i>Ophichthus gomesi</i>	Shrimp Eel
<i>Ophichthus spp.</i>	Unidentified Shrimp Eel
<i>Ophisthonema oglinum</i>	Atlantic Thread Herring
<i>Opsanus beta</i>	Gulf Toadfish
<i>Orthopristis chrysoptera</i>	Pigfish
<i>Pagurus impressus</i>	Dimpled Hermit Crab
<i>Pagurus pollicaris</i>	Flatclaw Hermit Crab
<i>Pagurus spp.</i>	Pagurid Hermit Crab
<i>Palaemonetes intermedius</i>	Brackish Grass Shrimp
<i>Palaemonetes pugio</i>	Daggerblade Grass Shrimp
<i>Palaemonetes spp.</i>	Unidentified Grass Shrimp
<i>Palaemonetes vulgaris</i>	Marsh Grass Shrimp
<i>Panopeus bermudensis</i>	Strongtooth Mud Crab
<i>Panopeus herbstii</i>	Atlantic Mud Crab
<i>Panopeus spp.</i>	Xanthid Mud Crab
<i>Paralichthys lethostigma</i>	Southern Flounder
<i>Parasitic Isopod</i>	Unidentified Parasitic Isopod
<i>Penaeus aztecus</i>	Brown Shrimp
<i>Penaeus duorarum</i>	Pink Shrimp
<i>Penaeus setiferus</i>	White Shrimp
<i>Penaeus spp.</i>	Unidentified Penaeid Shrimp
<i>Peprilus alepidotus</i>	Harvestfish
<i>Peprilus burti</i>	Gulf Butterfish
<i>Peprilus spp.</i>	Butterfish
<i>Petrolisthes armatus</i>	Green Porcelain Crab
<i>Phalacrocorax spp.</i>	Unidentified Cormorant
<i>Pogonias cromis</i>	Black Drum
<i>Polinices duplicatus</i>	Moon Snail
<i>Polydactylus octonemus</i>	Atlantic Threadfin
<i>Pomatomus saltatrix</i>	Bluefish
<i>Porichthys plectrodon</i>	Atlantic Midshipman
<i>Portunus gibbesii</i>	Iridescent Swimming Crab
<i>Portunus spinimanus</i>	Blotched Swimming Crab
<i>Portunus spp.</i>	Unidentified Portunid Crab

Listed alphabetically by common name:

Scientific Name	Common Name
<i>Lutjanus griseus</i>	Gray Snapper
<i>Petrolisthes armatus</i>	Green Porcelain Crab
<i>Sphyrna guachancho</i>	Guaguanche
<i>Peprilus burti</i>	Gulf Butterfish
<i>Menticirrhus littoralis</i>	Gulf Kingfish
<i>Brevoortia patronus</i>	Gulf Menhaden
<i>Urosalpinx perrugata</i>	Gulf Oyster Drill
<i>Opsanus beta</i>	Gulf Toadfish
<i>Arius felis</i>	Hardhead Catfish
<i>Rhithropanopeus harrisi</i>	Harris Mud Crab
<i>Peprilus alepidotus</i>	Harvestfish
<i>Gobionellus oceanicus</i>	Highfin Goby
<i>Trinectes maculatus</i>	Hogchoker
<i>Ischadium recurvum</i>	Hooked Mussel
<i>Caranx latus</i>	Horse-Eye Jack
<i>Menidia beryllina</i>	Inland Silverside
<i>Synodus foetens</i>	Inshore Lizardfish
<i>Portunus gibbesii</i>	Iridescent Swimming Crab
<i>Elops saurus</i>	Ladyfish
<i>Lutjanus synagris</i>	Lane Snapper
<i>Sphoeroides parvus</i>	Least Puffer
<i>Oligoplites saurus</i>	Leatherjack
<i>Callinectes similis</i>	Lesser Blue Crab
<i>Sicyonia dorsalis</i>	Lesser Rock Shrimp
<i>Achirus lineatus</i>	Lined Sole
<i>Libinia dubia</i>	Longnose Spider Crab
<i>Selene vomer</i>	Lookdown
<i>Squilla empusa</i>	Mantis Shrimp
<i>Palaemonetes vulgaris</i>	Marsh Grass Shrimp
<i>Polinices duplicatus</i>	Moon Snail
<i>Selene setapinnis</i>	Moonfish
<i>Neopanopeus texanus</i>	Mud Crab
<i>Ancylopsetta quadrocellata</i>	Ocellated Flounder
<i>Macrobrachium ohione</i>	Ohio Shrimp
<i>Pagurus spp.</i>	Pagurid Hermit Crab
<i>Lysmata wurdemanni</i>	Peppermint Shrimp
<i>Busyon perversum</i>	Perverse Whelk
<i>Orthopristis chrysoptera</i>	Pigfish
<i>Lagodon rhomboides</i>	Pinfish
<i>Penaeus duorarum</i>	Pink Shrimp
<i>Monacanthus hispidus</i>	Planehead Filefish
<i>Libinia emarginata</i>	Portly Spider Crab
<i>Tagelus divisus</i>	Purplish Tagelus
<i>Monacanthus setifer</i>	Pygmy Filefish
<i>Sciaenops ocellatus</i>	Red Drum
<i>Centropristis philadelphica</i>	Rock Sea Bass
<i>Membras martinica</i>	Rough Silverside
<i>Trachypenaeus similis</i>	Roughback Shrimp
<i>Cynoscion arenarius</i>	Sand Seatrout
<i>Sargassum spp.</i>	Sargassum Seaweed
<i>Latreutes parvulus</i>	Sargassum Shrimp
<i>Harengula jaguana</i>	Scaled Sardine
<i>Sphyrna lewini</i>	Scalloped Hammerhead
<i>Chrysaora quinquecirrha</i>	Sea Nettle
<i>Xiphopenaeus kroyeri</i>	Seabob
<i>Acetes spp.</i>	Sergestid Shrimp
<i>Neverita duplicata</i>	Shark Eye Mollusk
<i>Archosargus probatocephalus</i>	Sheephead
<i>Ophichthus gomesi</i>	Shrimp Eel
<i>Eucinostomus gula</i>	Silver Jenny
<i>Bairdiella chrysoura</i>	Silver Perch
<i>Cynoscion nothus</i>	Silver Seatrout
<i>Gobiesox strumosus</i>	Skilletfish
<i>Hexapanopeus angustifrons</i>	Smooth Mud Crab

Appendix 1 (continued):

Listed alphabetically by scientific name:

Scientific Name	Common Name
<i>Prionotus roscus</i>	Bluespotted Searobin
<i>Prionotus rubio</i>	Blackwing Searobin
<i>Prionotus tribulus</i>	Bighead Searobin
<i>Raja eglanteria</i>	Clearnose Skate
<i>Rangia cuneata</i>	Atlantic Rangia
<i>Rangia flexuosa</i>	Brown Rangia
<i>Rhinoptera bonasus</i>	Cownose Ray
<i>Rhithropanopeus harrisii</i>	Harris Mud Crab
<i>Rhizoprionodon terraenovae</i>	Atlantic Sharpnose Shark
<i>Sargassum spp.</i>	Sargassum Seaweed
<i>Sciaenops ocellatus</i>	Red Drum
<i>Scomberomorus maculatus</i>	Spanish Mackerel
<i>Scorpaena calcarata</i>	Smoothhead Scorpionfish
<i>Selene setapinnis</i>	Moonfish
<i>Selene vomer</i>	Lookdown
<i>Sicyonia dorsalis</i>	Lesser Rock Shrimp
<i>Sphoeroides parvus</i>	Least Puffer
<i>Sphyrna guachancho</i>	Guaguanche
<i>Sphyrna lewini</i>	Scalloped Hammerhead
<i>Squilla empusa</i>	Mantis Shrimp
<i>Stellifer lanceolatus</i>	Star Drum
<i>Stomolophus meleagris</i>	Cannonball Jellyfish
<i>Symphurus plagiatus</i>	Blackcheek Tonguefish
<i>Syngnathus louisianae</i>	Chain Pipefish
<i>Synodus foetens</i>	Inshore Lizardfish
<i>Tagelus divisus</i>	Purplish Tagelus
<i>Tagelus plebeius</i>	Stout Tagelus
<i>Thais haemostoma</i>	Florida Rocksnail
<i>Thalassia testudinum</i>	Turtle Grass
<i>Trachypenaeus similis</i>	Roughback Shrimp
<i>Trachinotus carolinus</i>	Florida Pompano
<i>Trichiurus lepturus</i>	Cutlassfish
<i>Trinectes maculatus</i>	Hogchoker
<i>Urophycis floridana</i>	Southern Hake
<i>Urosalpinx perrugata</i>	Gulf Oyster Drill
<i>Xiphopenaeus kroyeri</i>	Seabob

Listed alphabetically by common name:

Scientific Name	Common Name
<i>Scorpaena calcarata</i>	Smoothhead Scorpionfish
<i>Paralichthys lethostigma</i>	Southern Flounder
<i>Urophycis floridana</i>	Southern Hake
<i>Menticirrhus americanus</i>	Southern Kingfish
<i>Astroscopus y-graecum</i>	Southern Stargazer
<i>Scomberomorus maculatus</i>	Spanish Mackerel
<i>Leiostomus xanthurus</i>	Spot
<i>Chaetodon ocellatus</i>	Spotfin Butterflyfish
<i>Eucinostomus argenteus</i>	Spotfin Mojarra
<i>Lepisosteus oculatus</i>	Spotted Gar
<i>Cynoscion nebulosus</i>	Spotted Seatrout
<i>Stellifer lanceolatus</i>	Star Drum
<i>Tagelus plebeius</i>	Stout Tagelus
<i>Anchoa hepsetus</i>	Striped Anchovy
<i>Chasmodes bosquianus</i>	Striped Blenny
<i>Chilomycterus schoepfi</i>	Striped Burrfish
<i>Mugil cephalus</i>	Striped Mullet
<i>Panopeus bermudensis</i>	Strongtooth Mud Crab
<i>Clibanarius vittatus</i>	Thinstripe Hermit Crab
<i>Dorosoma petenense</i>	Threadfin Shad
<i>Eucinostomus harengulus</i>	Tidewater Mojarra
<i>Lobotes surinamensis</i>	Tripletail
<i>Thalassia testudinum</i>	Turtle Grass
<i>Phalacrocorax spp.</i>	Unidentified Cormorant
<i>Palaemonetes spp.</i>	Unidentified Grass Shrimp
<i>Eucinostomus spp.</i>	Unidentified Mojarra
<i>Parasitic Isopod</i>	Unidentified Parasitic Isopod
<i>Penaeus spp.</i>	Unidentified Penaeid Shrimp
<i>Portunus spp.</i>	Unidentified Portunid Crab
<i>Cynoscion spp.</i>	Unidentified Seatrout
<i>Ophichthus spp.</i>	Unidentified Shrimp Eel
<i>Alpheus spp.</i>	Unidentified Snapping Shrimp
<i>Gobioides broussoneti</i>	Violet Goby
<i>Mugil curema</i>	White Mullet
<i>Penaeus setiferus</i>	White Shrimp
<i>Panopeus spp.</i>	Xanthid Mud Crab

Appendix 2

Overview of Texas Shrimp Fishery Regulations

The annual commercial harvest of shrimp from Galveston Bay, Texas, averaged about 3.5 million pounds for the period 1982-89 (NMFS unpublished data). This includes a 1.4 million pound average harvest of brown shrimp, with peak production during May-July, and a 2.1 million pound average of white shrimp, with peak production during August-November. Brown shrimp landings include <10% pink shrimp which are not separated from brown shrimp by fishermen or processors. During an average year, about 97% of the shrimp caught in the bay are taken during May-November. The remaining 3% of the commercial table shrimp are taken as incidental catch by the live bait shrimp fishery during December-April. Shrimp effort, measured in days fished, follows the trend for catch. Over the past eight years, an average of about 6400 days of effort have been expended annually in Galveston Bay. TPWD fishing regulations affect this pattern.

Two different commercial shrimp efforts occur within Galveston Bay: commercial bay shrimping and commercial bait shrimp. The bay shrimping activity targets shrimp that will be sold to seafood dealers for human consumption. Bait shrimping targets shrimp that will be sold as live fishing bait. However, some of the shrimp taken by bait shrimping activities are sold to seafood dealers, who in turn sell them to the public for consumption. As much as 3% of the shrimp sold by seafood dealers comes from the bait shrimp fishery.

The bait shrimp fishery operates throughout the year, catering to the bait needs of recreational fishermen. Individuals shrimping with a bait license may harvest a maximum daily catch of 200 pounds, one-half of which must be kept alive, except during August 16-November 15. Only one main trawl, with a maximum width of 54 ft., may be used from the boat. Mesh size of the net may not be less than 6.5 inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. Unlike the bay fishery, the bait fishery is not restricted by any type of seasonal closure. Fishing may occur throughout the year from 30 minutes before sunrise to 30 minutes after sunset, except during the spring open season (May 15-July 15) when all shrimp trawling operations must terminate by 2:00 pm. Fishing is allowed in all major bays (upper Galveston Bay, Trinity Bay, East Bay, lower Galveston Bay and certain areas of West Bay) and bait bays (Intracoastal waterways, Chocolate Bay and those portions of West Bay excluded from major bay status) within the Galveston Bay complex.

The commercial bay fishery is managed with seasonal closures and gear restrictions set by TPWD. During the spring open season (May 15-July 15), shrimpers harvesting with a bay license may trawl with one main net no wider than 54 ft. In addition, mesh size may not be less than 6.5 inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. Fishermen are limited to a daily catch of 600 pounds and are permitted to shrimp only from 30 minutes before sunrise until 2:00 pm. Fishing is only allowed in the major bays of the Galveston Bay complex. These restrictions ensure that a sufficient number of shrimp are able to migrate offshore for reproduction. During the fall open

season (August 15-December 15), fishing may occur from 30 minutes before sunrise to 30 minutes after sunset. From August 15 to October 31, when shrimpers outside the bay mostly harvest white shrimp, bay shrimpers may harvest an unlimited amount of shrimp. However, they are restricted by a size limit of 50 heads-on shrimp per pound. From November 1 to December 15, no size limit is imposed on shrimp harvested in the bays. During the entire fall season, bay shrimpers are permitted to use on main net with a maximum total width, including doors, of 95 ft., and a mesh size not less than 8.75 inches long between the two most widely separated knots in any consecutive series of five stretched meshes. These regulations enable the inshore shrimpers to target the larger and more valuable white shrimp which remain predominantly in the bays and nearshore Gulf waters. Thus, shrimp with a commercial bay license is prohibited during the one month closure between spring and fall seasons and during the five month closure between fall and spring seasons. The use of TED's (turtle excluder devices) was mandated in 1992 by NMFS for commercial trawlers operating in inshore (estuarine waters). Certain exemptions for TED use apply to some vessels which limit net size and/or tow time.

Many shrimpers hold both bay and bait licenses to take advantage of the more lenient regulations of the bait license during the seasonal closures, as well as the larger poundage allotment afforded by the bay license during the open seasons. Thus, the percentage of shrimpers holding a bait license in conjunction with either a Gulf or bay license increased from 28% in 1981 to 41% in 1987 (source: TPWD license files for 1981 and 1987).

Appendix 3

Sample Data Sheets and Instructions for Observers

BYCATCH STATION SHEET

DATE		
MO	DY	YR

DATA SHEET PAGE ____ OF ____ PAGES

VESSEL (1)	GEAR SPECIFICATIONS (2):			TOW NO.	TEMPERATURES (° C)		
	TYPE	LENGTH	MESH SIZE		SURFACE	BOTTOM	AIR

START TIME	START LATITUDE	START LONGITUDE	START DEPTH	VESSEL SPEED	SALINITY (PPT)	SUBSAMPLE
HH MM	DD MM MM	DD MM MM		(KNOTS)	SURFACE BOTTOM	IDENTIFICATION NO.
LORAN #'S →						

END TIME	END LATITUDE	END LONGITUDE	END DEPTH	TOTAL WT. OF NET	TOTAL WT. OF NET	TOTAL CATCH
HH MM	DD MM MM	DD MM MM		WITH CATCH (LBS.)	W/O CATCH (LBS.)	WEIGHT (LBS.)
LORAN #'S →						
TOTAL SUBSAMPLE WEIGHT (LBS.) →						

FILL IN FOR SPECIES NOT RETURNED TO LAB FOR PROCESSING

(Additional Space On Back)

IDENT. GROUP (3)	GENUS	SPECIES	TOTAL WEIGHT (POUNDS)	TOTAL LENGTH (MM)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

CODES:

- VESSEL PREFIX: TR = TRINITY BAY, UG = UPPER/EAST GALVESTON BAYS, LW = LOWER/WEST BAYS
- GEAR SPECS: PROVIDE ACCURATE DESCRIPTION OF GEAR TYPE, HEADROPE LENGTH, AND MESH SIZE.
- IDENTIFICATION GROUP F = FINFISH, C = CRUSTACEAN, I = INVERTEBRATES (Other Than Crustacea), D = DEBRIS/TRASH O = OTHER (DESCRIBE)

COMMENTS (Use Back If Necessary)	BEAUFORT SEA CONDITIONS	WATER COLOR CODE	GEAR OPERATIONS CODE

VESSEL CAPTAIN SIGNATURE: _____

OBSERVER: _____

Field Procedures for Observers

1. Obtain subsample identification numbers for current day's trip from Eduardo Martinez or Dennis Emiliani. Record details of sampling trip in logbook, from beginning to end.
2. Upon arrival on vessel and while in route to trawl stations, set up gear in preparation for obtaining catch subsamples. This includes setting up the hanging scales, preparing identification labels for the subsample bags, recording vessel and gear specification data on station sheets, etc.
3. At the start of the trawl tow, record time, position and depth on by-catch station sheets (see instructions for filling by-catch station for additional information). **Enter all data on the by-catch station sheets as they are measured; do not wait to fill in the data fields later!**
4. During the tow, record vessel speed and comments regarding sea conditions, water color, net operations and type of tow (circular, zig-zag, etc). There is additional room for comments on the back of the data sheet; use the logbook provided if necessary.
5. At the end of a tow, during haulback, record time, position and depth on the by-catch station sheet. Obtain a surface water sample to measure and record salinity and temperature. If possible, obtain a bottom water sample for additional temperature/salinity measurements.
6. When the trawl cod end is placed on deck, measure and record the total net weight with the catch inside. This should be done by attaching the trawl cod end to the hanging spring scales. Upon removing the catch, re-weigh the net and record data on by-catch station sheets. Total catch weights are obtained by subtracting the net weight from the total weight of each tow.
7. Obtain a subsample of by-catch: When working aboard shrimp vessels, a subsample of ~25 lbs. will be taken from the net for analysis. The subsample should be representative of the total catch. Use a shovel to mix the catch before removing the subsample. [Note: On a live bait boat, mix the catch contents in the sorting box before removing subsample with a dip net, insuring that the subsample is a well-mixed sample of the total catch]. If needed, remove, measure and weigh any large species from the catch before taking a subsample. Anything removed from the total catch (fish, trash, etc.) before the subsample is taken must be recorded on the data sheet. Use back of data sheet or additional sheets if necessary. See list provided for scientific and common names of selected species. Place the subsample in a sample bag. Each subsample bag must contain a internal and external identification tag that has the following information on it:

- A. Date (Month, Day, Year)
- B. Vessel Name (with prefix code)
- C. Tow #
- D. Subsample ID # (assigned prior to sampling trip)
- E. Subsample weight (lbs.)

8. Once the subsample is obtained, place the subsample on ice and return to the laboratory for processing. Complete recording any pertinent comments on the by-catch station sheet or logbook. Assist the vessel captain with sorting the remainder of the catch.

Note: If a live sea turtle is captured in the net, it is imperative that it be brought back to the NMFS laboratory. Attempt to resuscitate unconscious sea turtles. Do not return any sea turtles to the water, regardless of apparent health condition. Radio back to laboratory for assistance or directions if necessary. Record incidence on sea turtle sightings form. Identify and record capture of dead or decomposing sea turtles. Every time you see a turtle, even if you do not catch it, fill out a turtle sighting form.

9. Upon returning to the laboratory: If processing of samples cannot be initiated immediately, place the samples in chest freezer for storage and later processing. Log all samples placed in freezer storage and submit data sheets to Eduardo Martinez or Dennis Emiliani. Wash/clean gear and place in storage areas. Remember to **record all information related to the sampling trip in your logbook**

ADDITIONAL INSTRUCTIONS FOR COMPLETING THE BY-CATCH STATION SHEET

DATE - Enter date of trip (MMDDYY).

PAGE #'s - Always record the number of pages associated with each tow/subsample, even if just one page (i.e., page 1 of 1, page 3 of 5 pages, etc.)

VESSEL - Use the codes on the bottom of the By-catch Station Sheet to fill in the vessel prefix. The vessel prefix denotes the area within Galveston Bay in which the shrimp boat is based. Provide the vessel code name in the rest of the space provided.

GEAR SPECIFICATIONS - There are 3 field related to gear specifications. These include gear type, length and mesh size. Limitations are specified by fishing regulations set forth by the Texas Parks & Wildlife Dept. and gear types and sizes may vary with different fishing seasons throughout a calendar year. Data for gear specifications must be recorded at least once during each sampling trip. Net length should be measured along the headrope from leading tip of door to leading tip of door. Also record the twine size in the comments section at the bottom of the data sheet.

TOW NUMBER - The tow number has a field width of 3. Tow numbers are recorded in the order that they are taken for each sampling day (i.e., 1,2,3, etc).

TEMPERATURES - Measure surface and bottom water temperature at least once daily or for each tow if possible. Record air temperature during each tow. If dramatic change in climatic conditions exist (i.e., onset of cold front), re-measure and record parameters. Water samples can also be used for measurement of salinity.

START TIME - Enter military time (0000-2359), HHMM, for the start of a tow (dog-off time).

START LATITUDE & LONGITUDE OR LORAN NUMBERS - Enter position occupied at start time in degrees, minutes, and hundredths of minutes, observing implied decimals and entering trailing zeros. LORAN #'s may substituted for lat./lon. readings. If no position coordinates are available from vessel, use Global Positioning System (GPS) locators provided by lab to determine lat./lon. readings.

START DEPTH - Enter starting depth to nearest tenth; specify whether fathoms, meters or feet.

VESSEL SPEED - Enter speed of vessel (in knots) during tow period, observing 1 implied decimal point.

SALINITY - Enter salinity of surface and bottom water samples at least once daily and with each tow if possible.

SUBSAMPLE IDENTIFICATION NUMBER - Enter subsample identification number. These are designated for consecutive tows (samples) prior to the sampling trip. The subsample ID numbers must include the same prefix assigned to vessel category which designates fishing area.

END TIME - Enter as for start time (fishing tows end at start of haulback).

END LATITUDE & LONGITUDE - Enter position occupied at end time. Use LORAN #'s if lat./lon readings not available.

END DEPTH - Enter end depth to nearest tenth; specify whether fathoms, meters or feet.

TOTAL WEIGHT OF NET WITH CATCH - Enter total weight of net and catch (in pounds) after haulback (prior to opening cod end).

TOTAL WEIGHT OF NET WITHOUT CATCH - Enter weight of net only (in pounds) after catch has been removed. Do this at least once per day, but preferably after each tow.

TOTAL CATCH WEIGHT- Enter total catch weight (in pounds) obtained by subtraction of trawl weight from total weight of trawl and catch.

TOTAL SUBSAMPLE WEIGHT - Enter weight of subsample (in pounds) taken from catch; this should be standardized to obtain a maximum of 25 pounds if present in the total catch.

IDENTIFICATION GROUP - Enter identification code for any items/species too large to include in the subsample. These may include large finfish, sharks, or debris items such as sargassum, 5-gal buckets, 55-gal. drums, etc. Codes are listed on the bottom of the By-catch Station Sheets (i.e., F = finfish, C = crustacean, etc.) Additional space available on back of data sheet.

GENUS AND SPECIES - Locate organisms on pre-printed species list. Enter genus and species names or a description of debris items. Additional space available on back of data sheet.

TOTAL WEIGHT AND LENGTH - If sampled, enter total weight (in pounds) and total length (in mm) of species. Enter weights only for debris items; data for debris items are extremely important because they are part of the total catch weight. Add trailing zeroes if needed. Additional space available on back of data sheet.

COMMENTS - Enter pertinent comments or observations. These may include:

- whether or not vessel captain uses a salt box to cull by-catch
- approximate size of shrimp being discarded from catch (total length in mm)
- a subjective estimate of the percentage of finfish by-catch that survive upon being discarded into the bay.
- whether environmental data are taken at beginning or end of a tow,
- tow description, operations codes (circular, zig-zag, etc.)
- distinguishable landmarks near start or end of tow
- climatic conditions (rain, heavy clouds, strong winds)
- sea conditions (see below for Beaufort Sea Conditions, water color codes, etc.)
- unusual catches/conditions (marine mammals, large concentrations of algae, seagrass, debris or jellyfish, oiled/polluted water, tow near marshes or land masses, etc.)

Additional space for comments is available on back of data sheet.

VESSEL CAPTAIN SIGNATURE - It is recommended that the vessel captain sign the by-catch station sheet to verify the date and location of samples collected.

RECORDER - Enter name of person(s) completing the form.

DATA CODES:

BEAUFORT SEA CONDITIONS

<u>Sea Condition</u>	<u>Description</u>
0	Wind speed under 1 knot; sea like mirror
1	Wind speed 1-3 knots; ripples with appearance of scales; no foam crests.
2	Wind 4-6 knots; small wavelets; crests of glassy appearance; not breaking.
3	Wind speed 7-10 knots; large wavelets; crests begin to break; scattered whitecaps.
4	Wind speed 11-16 knots; small waves

- 5 Wind speed 17-21 knots; many whitecaps, some spray.
- 6 Wind speed 22-27 knots; larger waves forming; whitecaps everywhere; more spray.
- 7 Wind speed 28-33 knots; sea heaps up; white foam from breaking waves begins to be blown into streaks.
- 8 Wind speed 34-40 knots; moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks.
- 9 Wind speed 41-47 knots; high waves; sea begins to roll; dense streaks of foam; spray may reduce visibility.

WATER COLOR CODES

- B =** Blue or clear
- G =** Green
- T =** Blue green
- Y =** Yellow
- M =** Muddy or brown

OPERATION CODES

- A =** Nets not spread; typically doors are flipped or doors hung together so net could not spread.
- B =** Gear bogged; the net has picked up a quantity of sand or mud such that the net can not be easily towed.
- C =** Bag choked; the catch in the net is prevented from getting into the bag by something (grass, sticks, etc.) clogging net or by the twisting of the lazy-line.
- D =** Gear not digging; the net is fishing off the bottom due to insufficient weight.
- E =** Twisted warp or line; the cables composing the bridle get twisted (from passing over blocks which occasionally must be removed before continuing to fish). Use this code if catch was affected.
- F =** Gear fouled; the gear has become entangled in itself. Typically this involves the webbing and some object like afloat or chains.
- G =** Bag untied; bag of net not tied when dragging net.
- H =** Rough weather; if the weather is so bad fishing is stopped, then the previous tow should receive this code if the rough conditions affected the catch.
- I =** Torn webbing or lost net; usually results from hanging the net and tearing it loose. The net comes back with large tears if at all. Do not use this code if there are only a few broken meshes. Continue using this code until net is repaired or replaced.

- J** = Dumped catch; tow was made but catch was discarded, perhaps because of too much trash, fish, sponge. Give reason in Comments.
- K** = No pick up; tow made but net not dumped on deck because nets are brought up, boat changes location and nets are towed more before decking.
- L** = Hung up; untimely termination of a tow by a hang. Specify trawl(s) which were hung and caused lost time in Comments.
- M** = Bags dumped together and catches not separated.
- N** = Net did not fish; no apparent cause.
- O** = Gear fouled on object. Net may be towed but performance is affected. Give specifics in Comments.
- P** = No measurement taken of shrimp or total catch.
- Q** = Cable breaks and net lost. Describe in Comments.
- R** = Net caught in wheel.
- S** = Tickler chain fouled or tangled.
- T** = Other problems (describe).
- Z** = Successful tow.

BYCATCH SAMPLE PROCESSING SHEET

PAGE ____ OF ____ PAGES

PROCESSING DATE			SUBSAMPLE IDENTIFICATION NO.		SAMPLING DATE			VESSEL (1)		TOW NO.		TOTAL SUBSAMPLE WEIGHT (LBS)	
MO	DY	YR			MO	DY	YR						

IDENT. GROUP (1)	GENUS	SPECIES	TOT. NUM. (2)	TOTAL WEIGHT (GRAMS)	TOTAL LENGTH (MM)	COMMENT CODE
1				.		
2				.		
3				.		
4				.		
5				.		
6				.		
7				.		
8				.		
9				.		
10				.		
11				.		
12				.		
13				.		
14				.		
15				.		
16				.		
17				.		
18				.		
19				.		
20				.		
21				.		
22				.		
23				.		
24				.		
25				.		
26				.		
27				.		
28				.		
29				.		
30				.		
31				.		
32				.		
33				.		
34				.		
35				.		
36				.		
37				.		
38				.		
39				.		
40				.		

- * - Obtain sampling information from bycatch station sheets.
 ** - Record comments for individual species on back of data sheet in order (i.e., comment code 2 would be 2nd comment on back of this form).
- (1). IDENTIFICATION GROUP: F = FISH, C = CRUSTACEAN, I = INVERTEBRATES (Other Than Crustacea), D = DEBRIS/TRASH O = OTHER (describe)
 (2). RECORD TOTAL NUMBER OF ORGANISMS ONLY WHEN OBTAINING GROUP WEIGHTS (i.e., 25 Shrimp, Hardheads, etc.)

SAMPLE PROCESSED BY: _____

Laboratory Procedures for Processing By-catch

1. Remove sample from freezer storage and thaw. Transcribe the data from the sample identification label onto the sample processing sheet.
2. Identify and sort the organisms in the subsample according to genus/species.
3. Up to 25 organisms per species group will be individually processed. If there are more than 25 organisms in the subsample for any particular species group, randomly select 25 and process them individually. Measure individuals to the nearest mm and weigh to the nearest 0.1 grams. Record data on the by-catch sample processing sheet when not using the electronic measuring device. Use total length (TL) for finfish and shrimp, carapace width (CW) for crabs and gape length or shell length for molluscs. If total length is not available for finfish, use standard length (SL); be sure to note use of standard length on the sample processing sheet. Enumerate the remainder of animals in each species group, and process them collectively by obtaining a size range (min.-max. size) and total weight (in grams).
4. To include comments/remarks for individual entries on a by-catch processing sheet, enter the comment code in the appropriate column and record comments on the back of the data sheet.
5. Place processed items in a disposable bag (along with sample identification labels) and return them to freezer storage until they can be disposed of.
6. Submit data sheets to Eduardo Martinez or Dennis Emiliani.

DATE - Enter date of sample processing (MMDDYY).

PAGE #'s - Always record the number of pages associated with each tow/subsample even if just one page (i.e., page 1 of 1, page 3 of 5 pages, etc.). Staple all sheets from individual subsamples together.

SAMPLE INFORMATION - Remove the sample identification tag from the bag and transcribe the sample information on the tag onto the By-catch Sample Processing Sheet. If there are several data sheets for each sample, record only the processing date and sample identification number on successive sheets and staple all processing sheets. Each sheet must contain the information regarding:

SAMPLING DATE
VESSEL NAME (WITH PREFIX)
TOW NUMBER
TOTAL SUBSAMPLE WEIGHT (Kg)

IDENTIFICATION GROUP - Enter identification code for any items/species too large to include in the subsample. These may include large finfish, sharks, or debris items such as sargassum, 5-gal buckets, 55-gal. drums, etc. Codes are listed on the bottom of the By-catch Station Sheets (i.e., F = finfish, C = crustacean, etc.) .

GENUS AND SPECIES - Locate organisms on pre-printed species list. Enter genus and species names.

TOTAL NUMBER - If measuring the total weight for a group of organisms, record the number of organisms in the group. Enter a 1 for individual length-weight measurements.

TOTAL WEIGHT AND LENGTH - If sampled, enter total weight (in grams) and total length (in mm) of species. If using a combined weight for a group of organisms, enter the size range in the total length category. Enter weights only for debris items; data for debris items are extremely important because they are part of the total catch weight. Add trailing zeroes if needed.

COMMENT CODE - If comments are necessary for any organism/item in the subsample, notations are written on the back of the data sheet and referenced on the front in the comment code box. For example, if you wish to include a comment for a particular fish measured, enter a 1 in the comment code box. On the back of the data sheet, the first recorded comment is associated with the fish that has a 1 in the comment code box. Comments continue in succession (i.e., comment code 4 = 4th comment on back of data sheet, etc.)

SAMPLE PROCESSED BY - Name or initials of person processing the subsample must be included at the bottom of each data sheet. If more than one person is processing the sample, each must initialize the sheet.